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THE PRACTICAL TEACHER

DR. PAUL PASSY.

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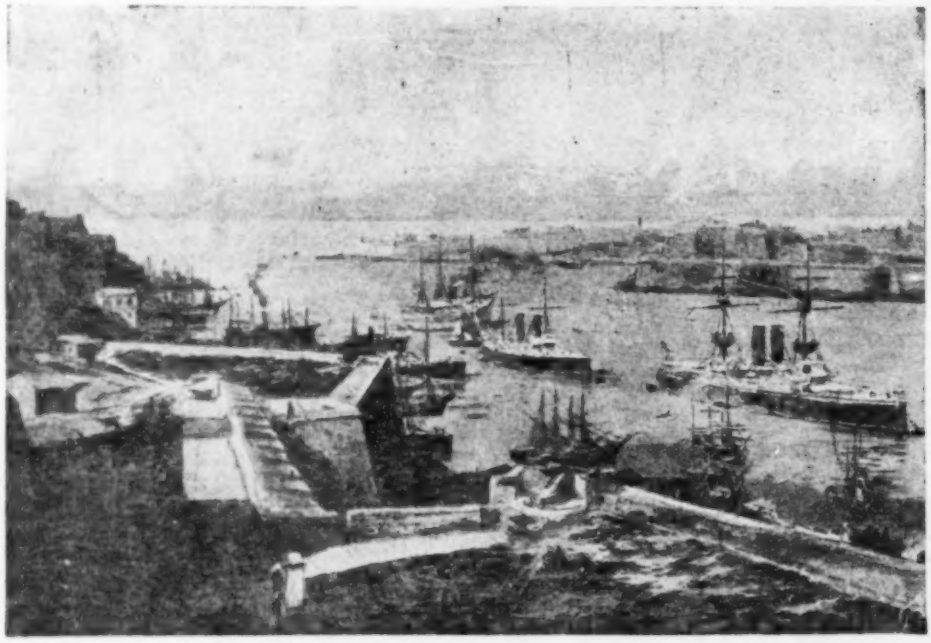

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EDUCATION IN PARLIAMENT—JULY.

A GOOD many things have happened since I last wrote. The King's illness, and the immense disappointment of the baffled Coronation, were an ill wind, but not so ill as to blow nobody any good. Incidentally, the postponement of the Coronation, and the abandonment of the Parliamentary recess for the celebrations, enabled the Education Bill to get a second innings, and there is now substantial progress with the Bill to report. And, for the most part, the schools throughout the country got a holiday, all the same.

A curious light is thrown upon our precious Board of Education by what happened in Parliament and its precincts over this question of Coronation holidays for the schools. Mr. Yoxall wrote to the Queen, and the King expressed his wish that a week's holiday should be given. Thereupon the Board of Education, in the person of Sir John Gorst, became sullen and mulish, and made no sign. Sir John refused to help managers to close school by reducing the minimum number of school openings to 390, averring, whenever he was tackled on the subject, that it was a "teachers' move." All that Sir John's eyes, turning their jaundiced glare upon the elementary school teachers—whom he is supposed to rule over, and whom he hates—could see in a school holiday for Coronation rejoicings was a pretext for teachers being lazy. Nice man, Sir John; industry is not the greatest of his own virtues by any means. However, Mr. Yoxall and Mr. Marshall Hall went over his head, and beat him at last. Mr. Balfour announced the holiday as "the wish of the King and the Government."

But the Parliamentary holiday never took place, and the Education Bill came under discussion even while the nation was holding its breath for news of life or death from the ugly grim pile of Buckingham Palace. At the date I write the Bill is by no means through Committee. There are fifteen clauses in it which invited and necessitated long consideration, and only six of these are dealt with so far. The Committee stage has occupied a month and a half, according to the calendar, although the breaks for "Supply" and the Finance and Licensing Bills have reduced the period actually given to the Education Bill to less than three full Parliamentary weeks. The first clause of the Bill was driven through the House of Commons, by the motive power of party spirit, unaltered; but a happier fate attended the clauses which immediately followed. I give below Clauses 2 and 3 as they stood, and as they were amended; the alterations are printed in italic letters.

As Amended.	As Introduced.
2. The local education authority *shall consider the needs and take such steps as seem to them desirable, after consultation with the Board of Education,* to supply or aid the supply of education other than elementary (*including the training of teachers and the general co-ordination of all forms of education*), and for that purpose *shall* apply *all or so much as they deem necessary* of the residue under Section 1 of the Local Taxation (Customs and Excise) Act, 1890, *and shall carry forward for the like purpose any balance thereof which may remain unexpended,* and may spend such further sums as they think fit: Provided that the amount raised by the *council of a county* for the purpose in any year out of rates under this Act shall not exceed the amount which would be produced by a rate of twopence in the pound, or such higher rate as *the county council, with the consent of the Local Government Board, may fix.*	2. The local education authority may supply or aid the supply of education other than elementary, and for that purpose may apply the residue under Section 1 of the Local Taxation (Customs and Excise) Act, 1890, including any balance thereof which may remain unexpended at the end of a financial year, and may spend such further sums as they think fit: Provided that the amount raised by the authority for the purpose in any year out of rates under this Act shall not exceed the amount which would be produced by a rate of twopence in the pound, or such higher rate as the Local Government Board may fix by Provisional Order made as respects any particular county or county borough on the application of the council of that county or county borough.
3. The council of *any* non-	3. The council of any non-

county borough or urban district shall have power concurrently with the county council to spend such sums as they think fit for the purpose of supplying or aiding the supply of education other than elementary: Provided that the amount raised by the council of a non-county borough or urban district for the purpose in any year out of rates under this Act shall not exceed the amount which would be produced by a rate of one penny in the pound.

county borough or urban district, who have power to adopt or have adopted Part III. of this Act, shall have power concurrently with the county council to spend such sums as they think fit for the purpose of supplying or aiding the supply of education other than elementary: Provided that the amount raised by the council for the purpose in any year out of rates under this Act shall not exceed the amount which would be produced by a rate of one penny in the pound.

The Education Authority "*shall*," instead of "may," supply education other than elementary; they are to *consult the Board of Education;* they are to act in *the training of teachers and the co-ordination of all forms of education;* they *shall* (not "may") apply the whisky money, and *all* of it (either at once or eventually, carrying forward the unexpended balances to a Local Education Fund account) to these purposes; and although the limit of a twopenny rate remains for counties proper, in the ordinary case a higher rate may be levied by a simpler form of procedure; and *for county boroughs there is no limit at all.*

The hand of the teacher-members may be seen in all this, as much by negotiation in the lobbies as by speech in the House; and already the Bill is being shaped into accord with the conditions laid down by the Conference of the National Union of Teachers. Moreover, one of the cardinal conditions laid down by that Conference has been obtained for the elementary schools: a new grant of an additional sum of £900,000 has been screwed out of the reluctant Chancellor of the Exchequer. The alteration in Clause 3, whereby *any* borough or urban district council may rate their area for education other than elementary up to a penny in the pound, is a change more doubtful in its character. It may be for good or ill; but it cannot be so much for ill as Dr. Macnamara, in one of his many and able speeches in the House, supposed. Most probably it will have little or no effect at all in the average case.

When the House got into the consideration of Clause 4, at once the fat was in the fire, for this clause deals with the eternal religious difficulty. The burning questions of training colleges and conscience clauses began to blaze. Mr. Balfour had, on the whole, tooled the Bill along in skilful and considerate style; indeed, there is reason to believe that he sincerely desires and means a great measure of educational reform without sectarian bias or unfairness. He did not fail in tact or temper even at this irritating part of the Bill; and before the debate could close on the first sub-section, or the vote take place, a break occurred—Mr. T. W. Russell moved the adjournment of the House, in order to discuss the pending evictions on the De Freyne Irish estate. And so the Education Bill stood adjourned till the following Monday. This gave time and elbow-room for the devising of a compromise on the training-college matter—a vital point in the Bill.

I have already referred to breaks of the kind. During one of them Scottish education was discussed. To the educationist how cool and refreshing, how workmanlike and educational, that little discussion, after the sound and fury of the English Bill! Happy Scotland, that has got its theologico-educational battle over long ago, and has now but to perfect a good scheme. The predominant partner is far less fortunate. If "happy is the country that has no history," happy is Scotland that needs no radical and comprehensive Education Bill.

With Clause 4 of the Education Bill began again the turmoil. The obvious reflection is that the battlefield of the old war between church and chapel has changed. The battlefield used to be the floor of the church; it is now the floor of the school. The attitude of Mr. Balfour towards this question was curious to study. As by heredity a Scotch Presbyterian, and by culture a defender of philosophic doubt, he might be taken as perhaps indifferent or even contemptuous to the squabble. But several members on his own side spoke plainly to him—among them Mr. Gray—and he consented to adopt for secondary schools founded by the local authority the Cowper-Temple Clause adopted in 1870 for Board Schools. But he said that this was not enough, and one could see that he meant that a Churchman's child must have a conscience clause against what is known as undenominational religious teaching. I give here the first part of Clause 4, as it was drafted, and as it was passed:—

As Drafted.	As Passed.
1. A council, in the application of money under this part of this Act, shall not require that any particular form of religious instruction or worship shall or shall not be taught or practised in any school or college.	1. A council, in the application of money under this part of this Act, shall not require that any particular form of religious instruction or worship, *or any religious catechism or formulary which is distinctive of any particular denomination, shall or shall not be taught, used, or practised in any school or college aided but not provided by the council, and no pupil shall be excluded from or placed in an inferior position in any school, college, or hostel provided by the council on the ground of religious belief, and no catechism or formulary distinctive of any particular religious denomination sha'l be taught or used in any school, college, or hostel so provided.*

Clause 5 carried the discussion on to Part III. of the Bill, which refers to elementary schools. This clause contained the power of option: a Local Education Authority might choose to confine itself to education other than elementary, or elect to take over Board and Voluntary school education as well. Long but desultory warfare was waged upon that clause, until at last Mr. Hobhouse, M.P., of Somerset, moved to omit the power of option. This amendment was carried, and the Chairman then proceeded to put the question, "That Clause 5 as amended stand part of the Bill." He declared that the "Noes" had it, and the clause thereupon ceased to exist. This ruling was at first misunderstood; but it was presently seen that the clause as amended by the omission of the option was redundant. So it has passed out of Parliament's ken to the limbo of dead and stupid proposals; so that here, as in other parts of it, the Bill is improved. I think it will come to be known as the greatest of English Education Acts, the death-blow of Voluntaryism, and the commencement of system and reason.

FERULA.

BRITISH MUSEUM

BY MANY HANDS.

"Quot homines, tot sententiæ."

A Visit to a French School.

A WELL-KNOWN English teacher recently spent a week in Paris. Thinking he would like to visit one or two French schools, and knowing that it was necessary to make a previous application for permission, he wrote to the Minister of Public Instruction two or three weeks before he started. As he had received no reply up to the time of starting, he paid a visit, as soon as he reached Paris, to the head-master of a large boys' school, whose daughter he had frequently met in England. This head-master received him in a most cordial fashion, but informed him that he was strictly forbidden to allow any one to enter a classroom without official permission, offering at the same time to accompany him to the "Bureau d'Administration," a kind of "Board Office" near the Hôtel de Ville. After visiting several offices, they at last discovered the gentleman who distributes such favours; but he informed our friends that he could not permit an Englishman to see a school without a letter from the British Ambassador.

Thinking this would be the end of the knot of red tape, our friend wrote to the British embassy explaining the facts of the case, and apologising for giving trouble about such a trifling matter. He received a reply next day, which, after acknowledging the receipt of his letter, ran as follows:—

"Sir Edmund Monson would gladly comply with your request; but all such applications have to be made through the Minister for Foreign Affairs, and no reply can be expected for at least a fortnight or three weeks.

"Should you be able to stay so long in Paris, and on hearing further from you on the subject, an application will be sent in to the Minister for Foreign Affairs; but as you say you are only spending your holiday here, His Excellency thought that you might not be able to wait so long."

Not knowing whether even the Minister for Foreign Affairs would venture to take upon himself—without calling a special meeting of the Cabinet—the responsibility of asking that a teacher might be allowed to peep into a school of which his friend was head-master, our friend decided not to press the matter further. Should it happen, however, that any one of our readers who is not over thirty would like to have an opportunity of visiting a French school before he dies, he had better begin to make application at once, so as to get all the references and cross-references completed in time.

Admission of Visitors to Schools.

THE above incident suggests a few thoughts on the general question of allowing visitors to enter a school. Let us consider first the objections. We can quite understand why great caution should be exercised in permitting unrestricted access to an arsenal or to a factory in which secret processes are in use; but nobody pretends that methods of instruction are secret. On the contrary, one has only to go to the educational press to see how anxious a teacher is to communicate to his fellows those methods which his experience teaches him are sound ones. It is true that a certain amount of the teacher's time must be taken up in showing a visitor round, and the attention of a class may be drawn from its work by the entrance of a visitor; but if the tone of the class is good, the disturbance is slight, and, in any case, must diminish as the children become more accustomed to see visitors. In some cases, those who are responsible for the equipment and organisation of a school are conscious of such neglect of duty that they are ashamed to allow any one to visit it. But the number of managers and teachers who are proud of the way in which their schools are equipped and conducted more than makes up for the neglectful ones, and to conceal a fault is the very worst way to get it remedied. On the other hand, although we once saw a bill announcing a show of fat cattle pasted outside a higher-grade French school for girls, we found that the show was not held inside; and we are sure that the general public does not regard a school as a place of entertainment, and consequently there is not likely to be a large number of applicants to visit the school beyond those who are deeply interested in education. We are all of us naturally suspicious of the stranger who begins to tell us how we ought to manage our own affairs; but when we are asked questions on our methods, we not only rejoice at the opportunity of helping a friendly visitor by giving him clear answers, but are often set to consider whether the methods we have been following are the best. We will not refer here to the excellent plan of inviting the parents to come, at stated times, and see the working of the school; for although it is an admirable plan to bring parents and teachers into closer co-operation, these are not the kind of visits we are now considering. But just as healthy plant-life depends largely on cross-fertilisation, so we believe that the progress of education is greatly assisted by leaving the head-master of each school absolute freedom to receive all callers from whose visit he believes there is an advantage to be gained.

FOREIGN NOTES.

New Zealand.

WE are always pleased to receive copies of educational magazines from the colonies; they generally show the difficulties of organising the work of education in a new country, and also show a keen spirit of determination that the work shall be done well. This is certainly the case with the New Zealand *Journal of Education*, which is now in its fourth year of publication. The discussion of the proposals to centralise the rural schools is very interesting, as showing how the difficulty of sparse population may be overcome. The articles are of high literary merit, and the notes on school-work and the specimen examination papers should prove very suggestive.

From the same office is issued *Schoolmates*, a monthly magazine for scholars. The selected matter is drawn from good writers, and the original matter is well calculated to inspire the young readers with an interest in what is going on in the world.

Holiday Courses.

THE teaching of modern languages in England must be improving. *Viva voce* examination tests for pupils, and hard work at holiday courses for teachers, are now a part of our educational life; and we must adopt the Yankee policy of "hustling," or be left behind the times. Now is the time to glance over the programmes, and decide our plans for the coming holiday. The subjects

at Tours are "L'esprit français" and "Notions diverses —à travers la littérature française." At Honfleur there are courses on "L'académie française" and "Les poètes lyriques français." At Jena the programme is arranged on about the same lines as last year. At Marburg the German lectures for August deal with the language, literature, and educational system of Germany, special attention being paid to pronunciation. There are also courses on Gothic architecture, and the origin of nations.

WE have been reading a little article in the American *Teachers' Institute;* and though the ideas are good, we could only wade through it as a stern duty.

American English.

In American English there is generally something which suggests what Taine rather severely calls the "démocratie grossière." "Other professionals plod daily for their experience, *thru* gain, *thru* loss, *thru* concentration of their best thought, won from books, from people, from everywhere; and so must our teacher win." That *thru* spoils it. The difference between *through* and *thru* makes one think of a picturesque old castle side by side with villas, ugly and callow and new. And such phrases as "an easy and interestless success" lead us to the conclusion that our cousins are deaf to cacophony.

THE poetical sense seems lacking, and imperfectly-rimed prose appears to be the chief material used for the school recitations:—

School Recitations.

"And as the sun came fainter down
Upon the brilliant floor,
The aged woman started at
The opening of a door;
And one who caught her haggard *eye*
All sudden stopped, *thru* sympa*thy*.

"'Oh, sir,' she said, 'these many hours
I've waited patient*ly*;
Perhaps the president cannot
Be seen by such as *I*;
I'm poor and old, and careworn too,
And he has burdens not a few.'"

The above is a specimen which makes us fervently hope that the Americans will not form an English Language and Literature Trust, or appoint Pierpont Morgan president of a Universal Anglo-Saxon Academy for the improvement of the English tongue.

BUT although the literary style is crude, the pages of this transatlantic *Practical Teacher* give clear evidence of true American earnestness, and sheer love of labour. We have never yet seen American teachers at work, but we cannot imagine them slow or listless. The pages of this journal palpitate with that nervous feverish activity which we are learning to associate with everything American. "Hustle" is to be read between the lines everywhere; and before writing five sums on the blackboard, the teacher says to the class, "I want you to be ready with the answers by the time I am *thru*."

American Teachers.

THE *Schweizerische Lehrerzeitung* contains a thoughtful article on the value of self-examination in the teacher. We are not all of us serious enough to review our day's work, and seek the possible cause of our pupils' failings in our own defects of manner or method. But when such a habit is once formed, it is bound to bring happy results. The zealous teacher will learn to direct and control his zeal; the unsuccessful teacher will light upon improved devices which may lead to success; the mechanical instructor will develop into a worthy disciple of Pestalozzi; and the impatient one will meditate upon the educational gain or loss involved in calling unsatisfactory scholars *Schlafmützen* and *Strohköpfe*, or their English equivalents.

Self-examination.

WHENEVER we read papers on "home geography" and its stimulating effect upon the whole nature of the child, we are puzzled to account for its slight development in this country. On the Continent, *Heimatkunde* and its necessary complement, the school excursion, are quite ordinary items of school-work. Who has not noticed in German and Swiss towns the happy bands of youngsters starting for a long ramble with their teachers? The systematic outfit and the efficiency of every arrangement show that it is no new or untried experiment. The influence upon the child must be immense. We remember once, in an old historic German town, listening with wonder and pleasure to the fluent descriptions of rampart and fortress given by the little daughter of our German friends.

Heimatkunde.

WE are apt to regard Finland somewhat as the Greeks did the dark realm of the Cimmerians. But after chatting with colleagues from this Northern land, we realise that it shares with the rest of Europe that almost uniform life which a French writer calls "la civilisation de partout." Both urban and rural elementary schools receive under certain conditions State grants. There are building rules for schoolroom, gymnasium, and workshop. The teacher's dwelling must consist of two spacious rooms and a kitchen. Sufficient land must be attached to enable the teacher to keep a cow, or a corresponding money allowance must be made to him. Most teachers have a potato-field, but actual gardens are rare. The rural teacher is supplied with wood and oil, and a contribution of £8 to £12 is made by the parish. The state salary is £32 for male and £24 for female teachers.

Finland.

"AFTER thirty years of service, a master is entitled to a pension of £40, a mistress to £30. In case of disablement, a pension corresponding to the length of service is granted. There is also a widow and orphan fund, aided by the State, an annual grant of £680 to enable each parish to form a teacher's library, and travelling expenses are allowed to teachers who attend conferences. Only trained teachers can be permanently employed; others are appointed provisionally." All this seems to indicate that in the land of the Cimmerians, though salaries are small, the lamp of knowledge burns with no uncertain light.

Pensions.

THE Swiss and American papers contain allusions to the scholarship scheme of our great empire-builder, and our American contemporary calls attention to the great cost of higher education in England as compared with the United States. But the question that occurs to us, when we consider this linking of our venerable university with the great world, is whether it will widen the narrow sympathies of the ordinary supercilious type of

The Rhodes Scholarship.

Oxford student, who cannot even *see* any one outside his set, and whose assumption of superiority, often unwarranted, is ludicrous, and indicative of a narrow mind or the cramping influence of caste. It would be pleasing to see the average Oxford undergraduate learning to realise the basis common to human nature in men of different nationality or country.

NOW that our elementary schools are forced to take up systematically the physical training of children, it is interesting to note the Continental methods of dealing with the question. Some years ago we travelled with a Czech who said he was a *Turnlehrer*, provided by his town with funds for an extensive tour of observation through many countries. He had studied cricket and football in England, the land of games, and was then on his way to witness a great gymnastic display in Hamburg. We are all aware of the vast scale upon which these festivals are organised in Switzerland, where so much importance is attached to physical training that the *Schweizerische Lehrerzeitung* publishes a monthly supplement specially devoted to the subject, and serving as the organ of the union of Swiss gymnastic instructors. Shall we take the following extracts as the exaggeration of the specialist or as words of weight and wisdom?

Physical Exercises.

"THE child does not love mere listening and accepting; he would prefer to *do* something—to seek, to investigate, to work with his teacher. Then he feels the exhilaration of growing power, he gains self-respect and confidence, his work becomes his joy. Such self-acquired strength will persist, will go on increasing after school days are over. Instead of tying down our young folks for six hours daily to the school benches, how would it be to try three or four hours daily, and so obtain more time for physical activity, in the form of handwork, drill, games, and excursions? It is probable that the loss of time for theoretical subjects would be amply compensated for by increased intellectual freshness. Instead of being listless and sluggish, our boys would grow vigorous, sturdy, and eager. In many schools there is too much teaching, and too little learning; too much information, and too little stimulus; too much verbal memory work, and too little independent thought; too much of dry-as-dust letters and books, too little vivifying study of things."

Activity v. Receptivity.

"WHY are so many of our young men dull and apathetic? Why is the beershop their Elysium, and shallow chatter their only idea of conversation? They have not learned to work, to push onward and upward alone. They do not know the zest of work. Let us give our pupils more opportunity than hitherto to increase their physical powers by gymnastics, games, and work; to exercise and train daily in the most thorough manner the sense organs—the instruments of the mind—by suitable handwork, experiments, investigation, and observation. One hour daily for physical exercises, and one hour for manual training, would develop both bodily and mental powers, and would have a stimulating effect upon the whole instruction. And if in all subjects activity instead of passivity were brought to the fore, that would prove the most efficient means of checking the school-weariness, apathy, and listlessness of our youth."

How to Train Workers.

WE are deeply interested in the prosperity of school savings-banks, but the means devised by French ingenuity for the purpose of encouraging thrift almost take one's breath away. We quote from the *Journal des Instituteurs*:—The future bride and bridegroom settle the day for the marriage, but the mayor has the right to fix the hour. Should the parties concerned require any hour other than that appointed by the mayor, he demands of them *an offering for the school bank*. A Parisian family are spending Sunday in the country, and instal themselves calmly for a pleasant picnic (*déjeuner sur l'herbe*). Suddenly the stern representative of the law appears before the trespassers, who, of course, are *stupéfaits*. Frenchmen, as we know, are subject to this complaint. However, the rustic guardian of the peace is not so terrible as he looks, and lets them off by exacting *an offering for the school bank*.

School Banks.

"UNDER present-day conditions of town life, the physical development of the child is cramped. Yet the chief object of schemes for social amelioration must be the child, and especially the child considered physically." Such are the principles upon which the good citizens of Hamburg go to work to secure for poor children a stay in the country. Then, by the kindness of benevolent people who feed and lodge the children free of charge, by means of subscriptions to meet the cost of outfit, and after declarations signed by the parents in order to diminish the legal risk and responsibility of the benefactor, the little Hamburger is sent off with a *Reisebuch* as his credentials to enjoy a spell of rural life.

Country Holidays for Town Children.

WILLY-NILLY, we are all more or less socialistic nowadays; and this is how the *Pædagogische Reform* gives the argument to prove that the State ought to take up even the question of town children's holidays. There are thousands of parents who have no time, no strength, no money to make proper provision for their children's holiday. The little ones have no healthy dwelling, no sufficient food, no proper clothing, no time for happy games. The State, by enforcing school attendance, has rendered it more difficult for the parents to meet the demands of modern life. Therefore, just as the State has placed itself *in loco parentis* in order to raise each little subject to a certain mental level, it must also see that the conditions necessary for the child's physical development are secured. Meanwhile, Hamburg philanthropy is doing by private effort the good work which it expects the State to take up in the future.

Philanthropic Socialism.

IS Spain awakening from her long sleep? Many there are who think that she still holds elements of greatness, and that decadence will be followed by a renewal of intellectual and national life. As we read the sweet, sonorous prose of Spanish authors, as we note in Spanish journals the pathetic references to the grandeurs of the past, and the eager desire for educational and other reforms, we cannot but think that the nation is reviving, either for a volcanic outburst or for steady growth. The eloquent speeches by ministers and university professors, delivered in homage to the young king at the recent "Festival of Science," all breathe the same spirit of eager

Education in Spain.

longing for educational progress. It is as though they were urging their king to dispel the clouds of ignorance with the fiat, "Let there be light."

FROM the *Heraldo de Madrid* we quote the following speech of the director of the Spanish National Library:—"With the dead I live, and they will say to Your Majesty, in far more eloquent words than mine, that which falters on my lips through timidity, or through some vague and solemn sadness which clings to us all amid the present rejoicings—a sadness not of depression or of evil omen, but of silent, thrilling expectation, like that which precedes the advent of great things. And who can fail to hope great things of him who was born a king, who was trained as a king, and who bears the name of the most glorious kings in our history? May Providence pour His gifts upon Your Majesty, and may we see in our day something to surpass even that which the books and manuscripts within these precincts tell of the intellect and culture of our fathers."

"Let there be light."

IN the *Deutsche Blätter* we find an interesting report of a lecture on German folk-songs. The speaker contrasted the true folk-song, which endures from generation to generation, with the short-lived sordid street song (*Gassenhauer*). He showed how the teacher could train his pupils to love the *Volkslied*, not by ridiculing the street song, but by the simple process of teaching the beautiful national melodies; whereupon the child would recognise that the latter are gold, and the street songs tawdry tinsel. The speaker illustrated his lecture by singing *Volkslieder* to piano accompaniment, and urged his audience to collect the many popular melodies which exist yet unwritten among the people.

Volkslieder.

AND where are our English folk-songs? and what is their place in the English school? Our school songs are often sorry stuff; and the pretentious cantatas given by ambitious head-masters, who are desirous of impressing the parents of their scholars, are sometimes not much better. We might do well to imitate our German colleague, and oust the hideous music-hall jingle of our streets by reviving the sweet old tunes which have come to us down the centuries—tunes such as those of which Reinhardt speaks in Theodor Storm's beautiful idyll of *Immensee*:—"They are not made; they grow, they drop from the air, they float hither and thither across our land like gossamer threads, and are sung in a thousand places at once. They utter our inmost thoughts and throes; it is as though we had all had a hand in the making of them."

A. E. S.

English School Songs.

N.U.T. NOTES.

THE deeply-lamented decease of Edward Lane Oliver caused a vacancy on the Executive in the representation of the South London electoral district. Mindful of the galaxy of "good men and true" in the associations south of the Thames, a keen and exciting contest was confidently anticipated, and I confess it was with considerable surprise that I learned that Mr. W. A. Nicholls had received a unanimous "call" to Russell Square. This very fact is possibly the best testimony to the reputation Mr. Nicholls has honestly won for himself as a strenuous worker for the Union, with a broad and thoroughly comprehensive educational and professional programme. Yet so essentially local is the interest now taken in Executive elections, that outside London the latest successful aspirant for Union honours is comparatively unknown. Mr. Nicholls was a pupil-teacher at the Barnstaple Wesleyan School. Completing his apprenticeship, he proceeded to Westminster (1867–1868), and at the termination of his college course took charge of a village school on the borders of Lancashire and Cheshire. In 1871 he migrated to Woolwich, where he first served as the head of a Voluntary school, and afterwards as a class-master under the London School Board. (By the way, the class-teachers at Bolton House can now, like the rurals, sing "We are seven.") He has all along played a particularly active part in political and municipal affairs in Woolwich and Plumstead, and is an able and fluent platform speaker. At this moment he is the secretary of the Woolwich branch "Mansion House Council on Dwellings of the Poor," and also auditor of the Plumstead Vestry, Burial Board, and Overseers' Accounts. Naturally, he has taken a prominent share in the work of the Woolwich T.A., and on the occasion of my visit two years ago, presided over a large meeting with characteristic dignity and power. He received a most cordial welcome on making his *début* at the Executive Board, and returned thanks in a little speech palpitating with both modesty and grace.

Mr. E. L. Oliver's Successor.

THE main factor in the success of the magnificent Boys' Home at Sydenham is undoubtedly the personality of the matron. However energetic and zealous the committee of management, however liberal the subscribers and supporters of the institution, there would always be a *soupçon* of non-success unless a lady capable in all respects were in charge of our fatherless boys. No less than 126 applications were received for the vacant post, and these were carefully and thoroughly examined by Mrs. Burgwin (whose devoted labours on behalf of "the Charities" will ever be gratefully remembered) and Mr. W. Brenchley (the vice-chairman of the committee). As the result of much consideration, eleven names were submitted to the committee, and from these four were chosen, and the candidates invited to meet the Council at its last meeting. The utmost pains were taken to secure the best candidates, as the following "method of selection" proves:—

The New Matron.

1. The applications, with testimonials of the eleven candidates selected by the chairman and vice-chairman, were read (in full) to the committee.
2. The papers of any other candidate desired by any member of the committee were also read to the committee.
3. When all such desired applications had been read, a ballot was taken, and the six highest candidates were submitted to a further ballot.
4. In the first ballot each member of the committee was allowed to exercise six votes, but not more than one vote to be given to any one candidate.
5. In the second ballot the three candidates receiving the highest number of votes were to be invited to meet the Council, and in this ballot each member of the committee was allowed three votes, but not more than one vote to be given to any one candidate.

It turned out that there was a tie for the third place,

and consequently four ladies were interviewed by the Council. By a practically unanimous vote, the choice fell on Miss M. E. Hartley, who for the past three years has held the appointment of assistant-matron at the Crossley and Porter Home and School, Halifax. If splendid recommendations, a gentle demeanour, and a kind face count for anything nowadays, the Council is to be most heartily congratulated on being able to command Miss Hartley's services.

"PHYSICAL training should be regarded as an integral and important part of the curriculum of every public elementary school." Such is the opening sentence of Schedule III. of the Day School Code (1902); and probably since the attempt to force the delightfully miscalled "suitable occupations" on the schools some seven or eight years ago, no schedule has created quite as much resentment, especially on the part of rural teachers. It is not that they object to physical training *per se*. But with staffs frequently inadequate, and playgrounds in very many instances wholly unsuitable, they simply exclaim, "It cannot be done!" "The instruction should, wherever possible, be carried on in the open air. Whenever outdoor space is not available, it should be given in the central hall; and where there is no central hall, it is recommended that a room should, if possible, be cleared for this purpose." Thus paragraph 4 of the schedule, and the sentiment is sufficiently admirable. Occasionally, however, neither outdoor space nor central hall is available, and the school consists of but a single room. What then? The concluding recommendation—"It is desirable that the instruction in physical training should be given, wherever possible, by the regular teaching staff of the school; but where no teacher is fully competent to give this instruction, the assistance of an instructor from outside should be obtained"—is simplicity itself, but there are difficulties in the way. The worn-out veteran nearing the superannuation age, who (almost) "lags superfluous on the stage," cannot reasonably be expected to go through a course of exercises with the skill of a German gymnast, whilst it is absurd to talk about calling in assistance "from the outside" in our rural parishes. At its July meeting the Executive decided to ask the Board of Education to receive a deputation on the whole question; and I sincerely trust that a material modification of the schedule will ensue.

Compulsory Drill.

FOR many years past I have advocated a "professional code of honour" for members of the National Union of Teachers. I brought the subject before the Executive as far back as 1895; and the result of an interesting discussion was that the late Charles James Addiscott (who was the very soul of honour himself) and I were requested to place on paper our ideas on the question. After a world of pains and trouble, we reported to the Executive what we were able to accomplish, but that august body declined to pursue the matter further. Our exordium was as follows:—"The following suggestions are made as the result of a widely-expressed wish for some professional code of honour which shall guide members in their relations to one another and to the Union. They are made in no dictatorial spirit, nor with a desire to define for all our members what constitutes honourable conduct. To ninety-nine hundredths of the members such a code is not needed, but the records of the Union show that what is needed is protection from the unprofessional conduct of the small minority whose presence is a doubtful gain to the Union. We desire to bring about both the spirit and the practice of real unionism among our members, and we ask you to accept these suggestions in that spirit." I frankly and gladly acknowledge that a much sturdier and more real unionism is prevalent to-day than in 1895, and yet the sense of the quotation above is even now strictly accurate. Lawyers, doctors, dentists, stock-brokers, etc., all have their professional etiquette; and there is little doubt that adhesion to such professional etiquette has made their members rich, honoured, and powerful throughout the land. By the way, there is a curious omission in the rules of the N.U.T. Rule 6 sets out in the plainest terms the conditions under which a member may be *excluded* from the Union, but there is no provision for the readmission of a member once excluded. My personal opinion is that quite as much care and forethought are required in readmitting as in expelling, and I hope to see the Executive deal with the matter at an early date.

Unprofessionalism.

SOMETHING akin to the proverbial "storm in a tea-cup" arose over a proposal to constitute the *soi-disant* rural members of the Executive a special committee to deal with all matters relating to village education. A few of the older members had not quite forgotten the fiasco of two or three years ago, and stoutly opposed the proposition; but in the end a sub-committee, to include the officers of the Union, the chairman and vice-chairman of the Education Committee, and Miss Selvage, Messrs. Butland, Gale, H. Lewis, R. N. Lewis, Moorby, and Winfield, was agreed to. My fervent desire is that the "truly rurals" will first of all *agree* about what they want doing; the rest is easy. If I were permitted to make but one suggestion to my country colleagues, it would be this: "Fix your whole attention on some three or four great objects, and don't attempt to settle (as in the past) the education problem." The class teachers, from the outset, realised the value of concentration; and he who runs may read their almost phenomenal successes in such matters as salaries, C.P. regulations, large schools, and classes. I am not sufficiently *au fait* with the conditions of service in village schools to understand what matters require attention first. Compulsory extraneous tasks, salaries, and inadequate staffing *seem* to be of urgent importance. A. C.

A Rural "Causerie."

WITH OUR CHILDREN.

THE present season has witnessed more than usual activity on the part of the British Child-Study Association, and indications are not wanting that the voices crying in the wilderness are being heard in the haunts of men. The annual conference, which was held in Liverpool in May, was full of promise, and not entirely empty of actual performance. It is surely worthy of note that this annual gathering of what are sometimes regarded as more or less harmless faddists should receive the patronage and hospitality of both the civic and the educational rulers of that great city. It is an eloquent testimony to the respect in which the local branch is held in Liverpool, and it is moreover a testimony to the open mind of those who guide the destinies of the city in matters of education and of civic welfare, that they should recog-

Activity of the B.C.S.A.

nise the value of a movement which is yet comparatively obscure and unfavoured.

* * *

Universities and Child-Study.

AN excellent reason was given by Principal Dale for the recognition of the Child-Study movement by the University. Twenty years ago, such recognition would have been impossible, but even academic persons learn something in the course of time: they have come through deeper insight to realise the unity of life and of education. The special work of the Association is to discover how best to lay the strongest and surest foundation for education and its complement, life. The more perfectly the Association succeeds in its purpose, the more easily and efficiently will the University do its work. The recognition so gracefully given to the work of the Association by the University is thus justified. There is a further relation between the two bodies which it was not, of course, the province of the learned principal to mention, but which may be freely stated here: there is no surer means of aiding the Association to succeed in its work than just this academic patronage, coupled with the academic guidance and help which Liverpool University College has already so ably given.

* * *

Practical Work in Liverpool.

DURING the course of the conference, an able and suggestive paper was read by Professor Skerrington, which may stand as an example of the way in which the university specialist can aid the Association in its work. He dealt first with a series of practical investigations which have been carried out by the Liverpool Branch, to discover what relations exist, if any, between the physical measurements of average children and their standing as to school work, and also how far these seem to be affected by the children's home conditions, as indicated by the class and locality of the school attended. In addition, by selecting children of the ages of six, nine, and twelve years respectively, a rough curve of average advance of measurements with age was obtained. The results of these investigations had been reduced to graphic tabular form, and were put in the hands of those attending the conference. Space forbids our discussing the records of this investigation. What we regard as of most importance is the fact that such an investigation has been made, on however limited a scale. We welcome every token that indicates a departure from the old contented ignorance regarding children, and every sign that teachers and others are awaking to the necessity for studying the child as the chief factor in education.

* * *

Suggestion from within.

AN important topic dealt with in Professor Skerrington's lecture was suggestion, using the word in the sense in which hypnotists use it. Suggestion is not confined to the hypnotic state; it is active in all minds more or less. In school work, suggestion often takes the place of thinking. Some curious examples were given. Present to a child a series of lines drawn on cards, one at a time, requiring him to draw on paper a line of the same estimated length as that shown him. If the first three lines increase in length by well-marked steps, and are then followed by others of the same length as the third, the child is very apt to represent the whole series as increasing by stages similar to the first three.

Suggestion from without.

TWO of the examples of suggestion from without seem to throw a curious light on the effects of certain types of questions used in examinations, oral and other. A small collection of familiar objects was shown to a number of children, and then removed. Among these was a postage stamp, and the children were asked to describe and draw the postal marks they had seen on the stamp. Many did so. The stamp, however, was an unused one, and bore no postal mark. Again they were asked, regarding a portrait shown among the other objects, whether the person represented held a hat in his hand, and, if so, to describe or draw it. A considerable proportion remembered and described the hat, though the portrait showed neither hat nor hand, but was merely a bust.

* * *

Dangers of Suggestion.

SUCH examples as these, which were quoted from the researches of Professor Binet of the Sorbonne, throw a new light on many events in school life. The mind, especially in certain individuals, is ever on the watch, as it were, to shirk work by becoming an automaton. In the case of the lines, two or three real differences suggest a whole series, in spite of the visible contradiction offered by the lines themselves. The mind suffered from suggestion from within, and lapsed into the automaton, instead of exercising judgment and memory. In the other cases, the idea of a postmark and of a hat was taken as a clue sufficient to work from, and the mind did not exert itself to call up the mental image of the object, which would have contradicted, or at least failed to corroborate, the suggested idea. One can see great danger in this line where a class is under a particularly active teacher, who may be ignorant of the power of suggestion. It is often hard for a teacher to avoid thinking for his class, and the class is apt to find it still harder in such a case to think for itself.

* * *

Agreed!

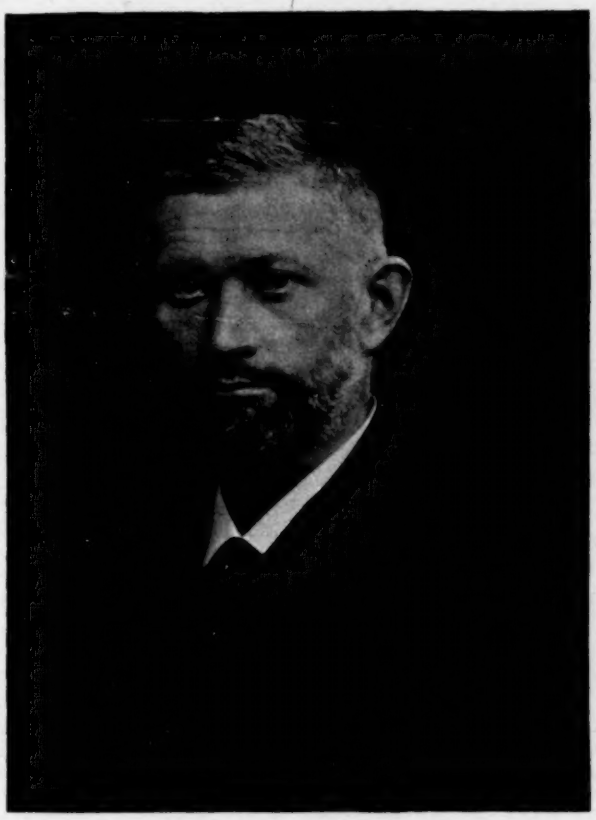
FROM the presidential address of the Rev. W. J. Adams, which dealt with many educational questions, we quote one sentence: "I feel sure you will agree with me that it is no unreasonable request to ask our educational authority, whatever its constitution may now or hereafter be, to give encouragement to the work of our society (the B.C.S.A.), in the belief that therein very practical help will be given towards the elucidation of some of the questions I have so briefly touched upon to-night." We *do* agree most cordially. When our brand-new educational authorities recognise the importance of that work, they will do more than give it encouragement; they will carry it on as a necessary part of educational work. Our new training colleges will possibly either lead or follow suit, and the missionary work of the B.C.S.A. will have been accomplished. We thank Mr. Adams for the suggestion, and we look to Liverpool to take the place in England which Chicago has taken in America as the first city to recognise the educational value of child study, and to act up to its convictions by instituting, under its Board of Education, a Department of Child Study to co-operate with the teachers in finding out what it is essential to know regarding the physical and mental laws of development in children. These laws condition all educational work. It is not the part of wise men to ignore them or to rest in ignorance of their action.

J. G.

NOTES FROM THE NORTH.

RETURNING to the question of irregular attendance mentioned last month in connection with the Report of the Scotch Education Department, I note with pleasure in the Report for the Western District of Scotland the remarks anent the subject of "regular irregulars." Mr. Andrew, H.M.I., says: "Attendance is the crux of the situation. I have given special attention to it during the past year, and the conclusion has been forced upon me that, in spite of all the present elaborate machinery—visits by compulsory officers, meetings with defaulting parents, attendance committees' statistics, etc.—there is from one year's end to the other no perceptible lessening of irregularity and intermittency. The mere money loss to the ratepayers is enormous. I observe that the Glasgow Board set down the annual amount of their loss from this cause at £14,000. The more serious aspect of the question is the large number of children who reach the age of exemption from the obligation to attend school without receiving any education deserving the name."

Attendance.



DR. PAUL PASSY.

THE present system of working the compulsory clauses in crowded districts is too slow and cumbrous in its process. What is urgently needed is a procedure quicker in its methods; more prompt dealings with the beginnings of irregularity; more persistent nagging and pegging away at the really bad cases; and for the very worst type of case, where children have got entirely beyond parental control, power in the hands of Boards to detain the children in a Truant School. Mr. Waddell, H.M.I., also refers to the subject, and is surprised at the fact that magistrates regard it as a harsh course to compel a child to attend school regularly. There is also reference to the question from the inspectors in Ayrshire and Wigtownshire, and it would appear from their remarks that the question of attendance requires to be kept well to the front. Can the Education Department not draw the meshes of the net closer?

Remedies Suggested.

THE Report of the Department considers the main subjects of instruction in our schools to be reading, writing, and arithmetic; and the committee consider that the instruction in these subjects should be so arranged as to lead to the attainment of the Merit Certificate at or about the age of thirteen, in the case of children of average ability and regular attendance. This standard may be attained at an earlier age by a certain proportion of the pupils, but the committee have thought it right, with a view to preventing over-pressure or undue concentration upon the fundamental subjects, to the neglect of other elements of a good education, to fix a minimum age of twelve for the granting of this certificate. This part of the report concludes by saying that the efficiency of a school will be judged of, not by its percentage of passes in any subject, but by the extent to which it achieves the ultimate object of school work as embodied in the requirements for the Merit Certificate, and by the manner in which it turns to account the various subjects of instruction for the moral and intellectual discipline of the pupils.

Subjects of Instruction.

BY the appointment of Miss Charlotte E. Ainslie, B.A. (Lond.), L.L.A. (St. Andrews), to the post of head-mistress of George Watson's Ladies' College, the Merchant Company of Edinburgh are making an experiment. Practically, it may be said that all the schools in Scotland are under head-masters, though there are one or two exceptions. The traditions of Scotland have not evidently favoured the appointment of ladies to these responsible positions. The experiment will accordingly be watched with great interest. In England, it has in the majority of cases been a success, and this has had considerable effect in bringing about the change.

A New Departure.

Mr. A. Thomson, the present head-master, who retires after fifty-five years' service, was in 1888 President of the Educational Institute of Scotland.

H. G.

A GREAT PHONETICIAN.

INTERVIEW WITH DR. PAUL PASSY,

Directeur-Adjoint à l'École des Hautes Études, Paris.

Der Sprachunterricht muss umkehren.—In 1882, Wilhelm Vietor, at the time Professor of Teutonic Languages at Liverpool University College, took up his parable against the vicious methods of teaching modern languages then (and now) prevalent in this and other countries of Europe, and especially in this. Remembering the opening words

of Cicero's philippic against Catiline—"Quosque tandem, Catilina, abutere patientia nostra?" (How long, Catiline, pray, will you abuse our patience?)—Vietor adopted these words as the keynote of his philippic against the bad translation method of so-called modern language teaching, crying out in the words at the head of this article, "The teaching of languages must be radically reformed!"

The Response.—Vietor's appeal was not altogether in vain. In Germany it kindled such enthusiasm as to bring about a partial if not a complete revolution in teaching methods. And if the response in France, England, Denmark, and other places was not so widespread, it was none the less fervent, as is shown by the fact that to-day such men as Sweet of Oxford, Passy of Paris, Jespersen of Copenhagen, not to name other men and women of other lands, are the centres of a vigorous movement that will ultimately place the teaching of modern languages in Europe, and in the United States, on a firm because logical basis, and the pitiable spectacle of men and women who are unable to speak a foreign tongue, to the study of which they have devoted years of their school life, or understand it when spoken, will no longer bear mute yet eloquent witness against the bad teaching of which they have been the victims.

A Sturdy Pioneer.—It was to interview Dr. Paul Passy, Treasurer and Secretary of the Association Phonétique Internationale, and editor of the *Maître Phonétique*—the militant organ of the association—that THE PRACTICAL TEACHER's interviewer hied himself to Paris, on the one dry Saturday that the wettest June of the last decade vouchsafed to us. Arrived in Paris, it was not difficult—thanks to the courteous directions of the doctor himself—to find the pretty suburban residence of the great phonetician at Bourg-la-Reine.

Afternoon Tea.—To say that Dr. Passy received the interviewer and his wife courteously, is to describe most inadequately the pleasant greeting and the cordial reception that was accorded to the two English strangers by Dr. Passy. It was gratifying in the extreme to note the celerity with which tea was prepared and placed before the lady—tea, too, that would have been a credit to any English tea-table, as the lady herself testified. This was only one of many little courtesies which showed the innate courtliness of our host, whom we voted, *instanter*, one of nature's gentlemen, and the best exponent of French politeness that it has been our lot, during many experiences of France and Frenchmen, to encounter.

After Tea, Talk.—We explained the purpose of our visit. We wished to know all about phonetics and the Phonetic Association. So Professor Passy began:—In 1886, that is about five years after Vietor had issued his famous pamphlet, a small group of French professors of living languages met together to establish a modern language association. The leading member of this group was Professor Passy. He and his colleagues had met with much success in teaching the pronunciation of English by means of a system of phonetics. They wished to benefit other language teachers by putting them in possession of this phonetic means of making the path of the learner smooth and easy. This was the beginning of the association and of the organ.

Le Maître Phonétique.—Professor Passy showed us the first number of the organ, which bore the name by which it is now known to so many teachers in so many different lands. It will interest English teachers to know that the earlier numbers were concerned entirely with English; but, in 1887, the scope of the association was so enlarged as to include the teachers, not only of English, but of all modern languages, and the popular green-backed monthly, which goes forth from Bourg-la-Reine, month by month, to all the civilised countries of the globe, began to take its present cosmopolitan and polyglot form.

The Phonetic Alphabet Fixed.—In 1888 letters were sent out to the leading phoneticians of the world—to Sweet in England, Palmgren in Sweden, Vietor in Germany, Jespersen in Denmark, and so on—asking them to give their adherence or to recommend changes to an enlarged alphabet, which had a definite sign for every definite sound of every well-known language. The result was the phonetic alphabet which we give below, and which is now in use in the *Maître Phonétique* and in all the publications—and they are many—issued by members of the *af*, as the Association Phonétique is almost lovingly known amongst the brethren.

Sweet's Broad Romic.—The association makes no claim to originality in respect to this phonetic alphabet. It is the broad Romic, as Professor Passy tells us as we sit in his pleasant study, of Professor Sweet—a fact that ought to send English teachers in their thousands to the association.

Phonetic Alphabet applied to French.

a	pa*tte*, p*ar*t	o	p*eau*, c*ôte*
ɑ	p*as*, p*âte*	ɔ	n*ote*, t*ort*
ɑ̃	*en*, t*ante*	ɔ̃	r*ond*, r*onde*
b	*b*out, ro*b*e	œ	s*eul*, p*eur*
d	*d*ent, ru*d*e	œ̃	*un*, *hum*ble
e	*été*, déja	ø	p*eu*, cr*eu*se
ɛ	l*ait*, t*ête*	p	*p*as, ta*p*e
ɛ̃	v*in*, t*einte*	r	*r*are, ro*r*d
ə	d*e*, cr*e*ver	s	*s*i, ro*ss*e
f	*f*ort, neu*f*	ʃ	*ch*amp, ha*ch*e
g	*g*ant, do*g*ue	t	*t*as, pa*tt*e
h	*h*aut, o*h*o	u	t*ou*t, t*our*
i	n*i*, p*i*re	v	*v*ent, ri*v*e
j	*y*eux, b*i*en	y	p*u*, p*ur*
k	*c*ar, ro*c*	ɥ	*hu*ile, n*u*age
l	*l*ong, seu*l*	w	*ou*i, p*oê*le
m	*m*ot, da*m*e	z	*z*èle, ro*s*e
n	*n*i, â*n*e	ʒ	*J*ean, rou*g*e
ɲ	ense*ign*er, pei*gn*e	ː	(signé de longueur)

Voici maintenant le tableau des lettres, classées selon les sons qu'elles représentent

		Labiales	Linguales	Palatales	Vélaires	Laryngale
CONSONNES	Plosives	p b	t d		k g	
	Nasales	m	n	ɲ		
	Latérale		l			
	Roulées		r			
	Fricatives	ɥ f v w	s z	ʃ ʒ	j (ɥ	(w)	h
VOYELLES	Fermées	(y) (u)		i y u		
	Mifermées	(ø) (o)		e ø o		
	Miouvertes	(œ) (ɔ)		e ɛ œ ɔ		
	Ouvertes			a ɑ		

Specimen of English in Phonetics.

Anglais de Londres. — fə ˈgɔd sɔu ˈlʌvd ðə ˈwäːld, ðət ij ˈgɛɪv ɪz ˈɔunlɪ bɪgɔtn ˈsʌn, ðət uwˈevə bɪˈlijvz ɪn ˈhim ʃud nɔt ˈpeɹɪʃ, bət ˈhæv evəluːstɪŋ ˈlaif.

Specimen of French in Phonetics.

Parisien. populaire. — paskə l bɔ̃:djø, il a tɛlmɔ̃ ɛ:me l mɔ̃:d, k il a dɔne sɔ̃ fis ynik, puʁ kə tu le sø:s ki kʁwa:j ɔ̃ lɥi swaj pɑ pɛʁdy, me puʁ k iz ɛj la vi etɛʁnɛl.

The Royal Road.—If there is a royal road to the learning of languages, it is undoubtedly that which Professor Passy and his fellow members of the association advocate. We ask the professor if he thinks that even young children can speedily learn and swiftly apply the alphabet to the acquisition of foreign words. The reply is, just as we expected, an unhesitating affirmative. He reminds us that this has been proved to be the case in many German schools where the *Laut-tafel* of Vietor is widely used, and where the pronunciation of foreign languages is much more perfect than with us.

The Direct Method.—Dr. Passy goes on to say that the association has always advocated the use of the direct method of teaching languages, just as strenuously as it has cried out for the employment of phonetic writing. From the very beginning the student is to speak the foreign language and to associate the thing and its name, as is done by the child when learning to speak. Grammar is to be learned intuitively, just as the child learns grammar. The simple fact that a child learns its mother tongue shows that he possesses a good method—namely, the method of imitation; and it is upon imitation that the good teacher will rely, leaving the aimless dry-as-dust learning of grammar rules and the writing of silly sentences to exemplify them to the old fogies who think that French, and German, and other living languages, should be taught in the same way as Greek and Latin.

Taking Stock.—Are the ideas so clearly expressed by Professor Passy taking root? is the next question put to our host. By way of answer, he points out that the association now numbers more than a thousand members, representing no less than thirty different countries and every one of the continents. Moreover, the publications of the association are daily increasing, both in number and in popularity. Amongst the best known of these are *Leçons de Choses*, *L'Ecriture Phonétique*, *Exposé des Principes*, *Premier et Deuxième Livres de Lecture*, *Lectures Variées*, *Les Sons du Français*, the four Gospels and the Acts of the Apostles, various tales and legends, and a fine *Chrestomathie Française* by MM. J. Passy and Rambeau, all of which, together with the thesis (*Etude sur les Changements Phonétiques*), presented by Professor Passy when a candidate for his doctor's degree in 1891, and which was awarded the Volney prize in 1892, are before us as we write. They can easily be procured by all who are interested in the subject of the rational teaching of modern languages. The greater part of these interesting books in phonetic script cost only a few centimes.

An Unselfish Movement.—Not only are these interesting little booklets issued at so cheap a rate, but members of the association may obtain the greater number of them at half price. And it is so easy and withal so cheap to become a member. The yearly subscription, which entitles one not only to membership but also to receive, month by month, a copy of *Le Maître Phonétique*, is only 3 fr. 50 c. (The writer of this article will willingly receive applications for membership, if addressed to the editor of THE PRACTICAL TEACHER.) It is pretty evident from what has preceded, that the group of enthusiasts who are seeking to popularise phonetics are not enriching themselves. Quite the reverse. If the value of the time spent in the work of propaganda is considered, it would not be saying too much to place the loss incurred by them as a body at many hundreds of pounds. Such unselfishness deserves to succeed. And looking at the spare figure and intellectual, determined face of Professor Passy as he sits before us, we have no doubt in our mind as to the ultimate triumph of the direct method and of phonetics.

NEW METHOD OF TEACHING MODERN LANGUAGES.

See Nelson's French and German Object Lesson Class Books and Wall Sheets.

Full List upon application to Office of this Journal.

Personal.—The photo which we reproduce, and which was taken whilst the professor was at Copenhagen bent on propaganda, will show what manner of man he is. It was amazing with what facility and purity he spoke English. Ninety-nine out of a hundred educated Englishmen would have to yield the palm to him for correctness and ease of speech. His knowledge of men and matters is profound. He has travelled much, not only in Europe, but in the United States of America. He was one of the sixty selected to visit the Yellowstone Park in 1883, at the invitation of Mr. Rufus Hatch, and a very interesting book, *Dans le Far West Américain*, written for young people, shows how widely his eyes are open when he is taking notes. At home, the professor devotes himself to the roomy garden that is attached to his "peasant's house," as he depreciatingly described it to us. He is known amongst his neighbours as an ardent temperance advocate, and as an outspoken opponent of betting. Altogether he is a most interesting man, and it will be long ere the remembrance of his geniality fades from our minds. That he and his phonetics and his direct method may increase and prosper, is our best wish for the talented and courteous phonetician.

MR. SADLER'S SPECIAL REPORTS.

VOLUMES VIII. AND IX.

II.—VOL. IX.: EDUCATION IN GERMANY.

An Aftermath of the Paris Exhibition.—Notebook in hand, Mr. Sadler, in 1900, visited the Parisian World's Show, under orders to write a report on the educational section. He soon found that education could best be studied in sections other than those devoted to education pure and simple, for he rightly regarded the excellence of the industrial products in general as the best proof of the strides made by education in the countries from which they came. Hence, instead of a volume from the pen of Mr. Sadler describing the exhibits themselves, we have a series of volumes from many hands descriptive of the diverse educational movements and systems to which must be ascribed the industrial progress that impressed itself so strongly upon the Director of Special Inquiries and Reports.

Mr. Sadler on Unrest.—From the pen of the director come two articles—namely, the opening item and a later contribution entitled "Recent Developments in Higher Commercial Education in Germany." The former of these two essays is on "Unrest in Secondary Education in Germany and Elsewhere," England being included under "elsewhere." It is comforting to learn that there are many good solid features in our English system, or want of system, in secondary schools. What we lack, according to Mr. Sadler, is intellectualism. What we excel in is physical and moral training. He scouts the idea of imitating the Germans or any other nation. The genius of the English nation demands peculiar developments, and, at the most, we must look for suggestion, rather than for solution, from beyond the seas. Pope's advice appears to sum up Mr. Sadler's ideas as to what should be done by English reformers, namely—

> "Be not the first by whom the new is tried,
> Nor yet the last to cast the old aside."

The Sides of the Shield.—Different nations, of course, lay different stress on this or the other outcome of secondary education. "The German is apt to ask about a young man, 'What does he know?' The American to ask, 'What can he do?' The Frenchman to ask, 'What examination has he passed?' The Englishman's usual question is, 'What sort of a fellow is he?' All four are tacitly referring to a current and rather vague idea prevalent in their respective countries as to whither a prolonged course of education should have led." The whole

essay of one hundred and ninety-two pages is replete with suggestion, and full of information. It should certainly be read by all who are interested in the building up of a sound scheme of secondary education in England.

Mr. Twentyman, who is Mr. Sadler's assistant, follows with a sketch of the new matter to be found in the 1901 Curriculum for Prussian Higher Schools for Boys, concerning which we need only say that the newest methods are insisted upon in the teaching of all subjects, and especially of modern languages and science. The go-as-you-please system with which we are familiar in England is not tolerated in Prussia.

Miss Lyster, the head-mistress of Ravensbourne School, Twickenham Park, contributes an introductory sketch on higher schools for girls in Germany, the matter contained in which she gathered during a six months' stay in the Fatherland—namely, from June to December 1899. The article contains nine sections, of which the most interesting are those referring to the training of women teachers, and the comparison between the English and German systems contained in the summary. It is a well-known fact that Germany does not believe in the higher education of women to anything like the extent that the belief is held by Englishmen. There are 196 public secondary schools for girls in Germany, with a ten or a nine years' course. All except six have been founded during the present century. There are 128 in Prussia, 24 in North Germany, and 44 in South Germany. Of these 128 Prussian schools only four have been founded by the State. Many of the best higher schools for girls in Germany are private, the standard of work in them being so good that no interference by government or town council is needed.

Modern Languages Again.—Everywhere these are taught by the new method, and Miss Lyster confirms the dictum of all who have seen this method in use, that "the results are wonderful, and have been praised by every one who has had any experience of them." She also testifies "how obsolete the usual English methods appear by contrast."

In chatty style Miss Lyster tells of the remainder of the curriculum, and shows how the teacher has to conform to modern ideas in every subject. As to salaries, they range low; but they are fixed, and as living is very inexpensive, the teacher is in a good position, even from the pecuniary standpoint.

Training.—Women who intend to teach have a special professional training in one or other of the several Seminars, the art, theory, and practice of education being soundly taught. The following is rather *naïve*:—"Many practical and in every way admirable students make excellent elementary school teachers, who would not have been a success in secondary schools. There is nothing derogatory in being a teacher in an elementary school in Germany. In that country there is a universal respect for teaching as a noble and lofty profession, whether practised in an elementary school or in the university." How different from England, where Parliament gravely sets out a special column in the Teachers' Register for secondary teachers, and will not have this defiled by the inclusion of a single elementary teacher, even though he be a senior wrangler!

Miss Lyster tells the tale of the struggle for the admission of women to university courses in Germany—a struggle that still continues, and is likely to continue for many years; for in Germany there is much more prejudice against the "sweet girl graduate" than there is with us, and that is saying a good deal.

Of the comparison, we can only say that it is well written and of exceeding great interest.

The Smaller Public Elementary Schools of Prussia and Saxony.—Mr. Field has shown great discretion and much sound knowledge in writing this interesting article. We should like to quote freely from his report, but that is out of the question. We learn that the Germans will have none but adult teachers, even in their small schools. The preparation of the reading lesson by the German teacher is invariable, and to this preparation Mr. Field attributes the power of expression and exposition which were characteristic of the teachers whom he saw. *Per contra*, the school buildings of our country are greatly superior to those seen by the writer of the essay.

In Prussia the office of teacher is much sought after, though 87 per cent. of the teachers are men. A "high authority" gave the following reasons for this gratifying popularity:—

1. The teacher's pay is not bad for Germany.
2. He has a definite position, definite rights as a civil servant, and a fixed pension. His office is respected, and his position in villages is next to the clergyman's.
3. He frequently makes an advantageous marriage in country places.
4. There are no barriers. A teacher may become a Rector or a Schulrat. A Rector in Berlin gets £175 to £225 a year, with a house worth £40. The pay of a Schulrat is from £225 to £250.

Particulars are given as to every detail concerning the work and training of both children and teachers. We advise our readers to go carefully over the whole of the article, which is admirably written and conveys valuable information.

Mr. Twentyman follows with a note on impending changes in the professional training of elementary school teachers in Prussia, concerning which we have only to remark that they will make the Prussian school teacher even more efficient than he is to-day, which is saying much.

School Gardens.—Our old friend Mr. Rooper is responsible for this portion of the volume, and we need hardly say that the subject is handled skilfully, the uppermost thought everywhere being, How does it make for real efficiency both in and out of school? The origin of these gardens is pointed out clearly in the following extract:—"A few years ago, the inspector said, the fruit trees were sadly neglected, and the peasants knew so little about fruit-growing that they bought from the south of Germany worthless trees that were rejected by the growers there..... More than this, the peasants knew no more how to plant or tend their trees than how to choose them." This gives a good hint as to the utilitarian or bread-and-butter side of the gardening instruction. The discipline or school side of it is also plainly shown in Mr. Rooper's well-thought-out article, of which, however, we can say no more.

Rhineland Impressions.—This diverting contribution is from the pens of Mr. R. E. Hughes, H.M. Inspector of Schools, and Mr. W. A. Beauland of Swansea Grammar School. We can make but few extracts, although we had marked upwards of twenty as meriting quotation.

Proud and not Poor.—"It has often been said that the German teacher is poor but proud. Proud, perhaps, but we hardly think that to-day he would be considered poor..... A head-master of a mixed elementary school told us that his income was £160 per annum—a salary by no means contemptible in Germany, where money is worth more than with us." Nor does this apply only to the towns: indeed "on the whole the German rural teacher gets the better of the comparison."

The Religious Difficulty.—"Under one roof, and in the same block, with separate teachers and text-books, were two complete and independent schools—one a seven-class Protestant school, and the other a fourteen-class Catholic school—living in peace and concord with one another, and using the same playground and offices."

£100 per Head.—The new commercial school of Cologne, which will have accommodation for six hundred boys, will cost, when completed, £50,000. The Goethe Gymnasium at Frankfort cost even more. The school is not quite full, but taking the present number of scholars, the cost per head works out at over £100. One of the Cologne elementary schools, with accommodation for 1,600 children, cost, we were told, £25,000, exclusive of the site. A Frankfort Mittelschule for girls cost the municipality £20,000, and has at present four hundred scholars. This is considered to be the finest school of its kind in Germany. An elementary school we saw in Frankfort cost £23,000, and has nine hundred children, in eighteen classes, with twenty-two teachers. This school is fitted with shower-baths for washing the children weekly. One secondary school alone costs the municipality of Cologne £8,000 per annum; and the director told us he was stinted in no way. "Whatever I

want I may have. I spend £60 yearly in additions to our natural history collection alone."

Where the Money comes from.—"At Aix-la-Chapelle, we were told, some years ago an insurance society was founded, and one of the articles of association was that any sum actually earned over and above a certain percentage was to be devoted to charitable and educational purposes. The society has succeeded beyond hope: it has an enormous annual surplus, which it has devoted to building and equipping one of the finest commercial schools in Germany."

We should like to tell of the rurals who got the authorities to build them a school nearer home, because their children had to walk half a mile to the far end of the village, where the first school was situated; and of the child who had not seen a sparrow; and of many other diverting items, for which, however, we must refer our readers to the book itself.

Berlin Continuation Schools.—There is a fine field for the operations of the redoubtable Mr. Cockerton in Berlin, for here are continuation schools teaching the elementary subjects, and also trade and commercial subjects, even up to Russian; and judging from Dr. Bartram, who is responsible for this article, the Berliners are proud (instead of ashamed) of their schools, which meet not only on week-day evenings, but also on Sunday mornings; moreover, they only charge a fee of 1½d. per week, which is remitted in the case of apprentices.

We pass by the note on the earlier history of the technical schools, not because of lack of interest in Mr. Twenty-man's sketch, but on account of lack of space. The following words, however, with the transposition of names, must echo the thoughts of many such men as Mr. Haldane, who voiced similar sentiments in the House of Commons on the occasion of the second reading of the Education Bill. They were spoken by Professor Finckh in 1829:—"We have all looked on idly while England gathered strength; she now enjoys the fruits of her labours, which will not be lessened or taste less sweet on account of our envy. Nothing remains for us but to win these fruits, and nothing can stop us as soon as we have learned to sow the seed and reap the harvest. This seed is nothing more than the preparation of knowledge, and this we must scatter with no sparing hand." How well the seed has been sown, and how rich the harvest has become, we in this country are beginning to realise to our cost, and it will be well for us to sound an alarm and to do a little sowing in our turn.

Mr. Sadler's Second Contribution.—Concerning the developments of commercial education in Germany, the Director of Special Inquiries has much to say. The gist of his discourse may be judged from the following:—"We do not mean to imply that attendance at courses of lectures on commercial subjects can in itself create a successful man of business. Theory can never be a substitute for practice, but practice means much more to a man who has a firm grasp of theory."

Measurement of Mental Fatigue.—Mr. Parez of Merchiston School, Edinburgh, tells us all that is known of the apparatus used and of the procedure followed in the concrete measurement of mental fatigue. It has been found by Kemsies and Friedrich—the two authorities on the subject—that the capacity for mental work is less in the afternoon than in the morning, which is just what we should expect to find. When, however, we learn that gymnastics and drill demand more mental expenditure than mathematics, foreign languages, religion, German, natural science and geography, history, drawing, and singing (the subjects being in the order of the degree of fatigue resulting from their study), we cannot but be surprised; but there is no room for doubt, since all competent witnesses testify to the same truth—namely, that gymnastics is anything but a mental restorative.

Feeble-Minded Children.—Two short articles on the teaching of the feeble-minded bring the volume to a close, and very little need be said on the subject except to remark that the arrangements made by the London and other large School Boards for the mental and physical development of these unfortunates is broadly on the same lines as those laid down in Germany, where the question of how to deal wisely with these afflicted ones has been considered by medical men and teachers in conference on many occasions.

Conclusion.—It is with many promises of future dippings into this goodly book that we lay it aside with the reflection that Mr. Sadler has given us much food for thought, which, when properly digested, will yield much suggestion and guidance, especially if we take to heart the warning that English progress must be *sui generis*, and not a mere replica of what has obtained in Germany, otherwise the steps taken may probably be backwards instead of forwards, and the last state of our country be worse than the first. The new Bill, when it becomes an Act, will give us our opportunity, and that we may use it wisely and well will be the earnest prayer of all good Englishmen.

A NATION'S ANNALS.

BY HAROLD ARMITAGE.

SAID one wayfaring man to another, quite recently, in Fetter Lane, London: "What building is that?"

"Oh, I don't know, but I suppose it must be St. Dunstan's," replied his companion, therein revealing unexpectedly that Cambridge is not the only city that has amongst its buildings a "Freshman's Church."

This laconic conversation was significant. The Record Office is not a building to be passed lightly by and no questions asked; and the inaccurate answer is an indication of how far John Bull is from any knowledge of his own muniments.

Massive and spacious, as the need is in such a building, Sir John Pennethorne's tower dominates Fetter Lane; and the recent addition to the capacity of the institution, designed by Mr. John Taylor, rises far above the other buildings in Chancery Lane. On this side, too, the style is austere, relenting only where the great central tower terminates in an outburst of richly-wrought pinnacles, finials, and turrets, built of a stone that gleams in the sun, making a pleasing passage of light and colour sometimes.

For the present, however, our thoughts run on parchment rather than on pleasing passages of light and colour; and we leave the sky that we may contemplate sheepskins, for it is but a few steps, under this lofty tower and across the court, to the accumulated documents of eight hundred years, to the most ancient, the most complete, the most varied, the most numerous, and the most continuous records of its history that any nation has yet been able to save.

From the law courts and other places have come yard after yard of records in the shape of rolls, for it was in this form that the annals were commenced soon after the Norman Conquest; and though to the unimaginative these rolls are naught but musty sheepskins, yet, as they are unfolded, one may see troops mobilised, may hear the din in the ship-builder's yard as fleets are formed and equipped; may witness the ratification of treaties, the fortification of castles, the assembly of parliament, the raising of subsidies; and may become acquainted with the details of all manner of national business connected with kings and queens, and peers and commoners. Sometimes it is church business that is being transacted; then a state prisoner is receiving pardon. Rapidly the scene changes, and a castle is being besieged, or a safe-conduct is being granted to an unpopular prelate. Again we see church lands bestowed, negotiations opened with foreign powers, titles of nobility issued, wardships granted, or rebellions suppressed.

It is from the Court of Chancery that a very large number of these rolls have come, and here also is the output of the Court of King's Bench, with a copy of the Book of Common Prayer, sealed in accordance with a law enacted in the reign of Charles the Second. At the restoration of that monarch, a number of commissioners met in the Savoy Palace, on the Strand, to revise the Prayer Book. When their work had been completed, printed copies were certified to be correct, and these, having had the Great Seal attached to them, have since been known as the "sealed books." One was deposited in the Tower of London, one in each of the courts of law—then at Westminster—and one with each cathedral chapter.

And this "sealed book" is the authority for spelling the name of a current coin of the realm "peny."

Another important series of rolls consists of those of the Court of Exchequer, often spoken of as the Pipe Rolls. Upon these have been recorded the details of the revenues of the Crown from every source; and beginning during the reign of Henry the Second, they proceed, with only two or three gaps, to the present time. No wonder that one finds the historian so busily engaged with these rolls; and as they contain the names of most men of property, they are very frequently scanned by the compiler of pedigrees.

Occupying a place anterior to the time in which these valuable records commence is a roll which belongs to the thirty-first year of the reign of Henry the First. This is one of the prizes of the Record Office, for it is the earliest national document of any considerable length, save only Domesday Book, that now exists in all the world.

During recent years, too, when the various offices of the State—the War Office, the Home Office, and the other Government offices—have found their treasuries full of documents, those papers not likely to be needed for frequent reference have been sent here; so that there is a steady tide of parchment flowing from Whitehall to the Record Office, that, many years hence, some groping fellow of the Society of Antiquaries may discover the feverish nineteenth century at rest in a strata in Chancery Lane, much as the paleotherium was found reposing in beds of Eocene. These documents formerly went into the State Paper Office, but the State Paper Office was amalgamated with the Public Record Office in 1854.

To indicate all the kinds of documents in this building would require not a whole number merely, but a volume of this magazine; for all subjects, from sewers to piracy, from Papists to manumissions, and from Jews to derelict lands and jail deliveries, find mention in these countless documents. Of affidavits alone, from the year 1611 to 1869, there are 2,380 bundles; and concerning Chancery proceedings from the reign of Elizabeth to that of Charles the First, there are 2,240 bundles.

Before the records of the law courts were at last gathered together and arranged in this building as one sees them now, they had such strange adventures that the wonder is they have reached our own time at all. During the years immediately following the Norman Conquest, when the courts of law accompanied the king from place to place, the records were kept in various royal palaces in different parts of the country. But when the courts became stationary, the documents were placed in the treasury of each court. In time there accumulated such a large number that the places available for their disposal became too small, and documents were accordingly taken to Westminster Palace, to the Chapter House, and to the cloisters of Westminster Abbey.

Other records during the reign of Richard the First were committed to the Tower, and there has been also a period during which the very parochial arrangement existed under which Masters of the Rolls kept the records in their own houses. Later, about the time of Edward the Fourth, a chapel in Chancery Lane was used. The chapel was then known as the *Domus Conversorum Judaeorum*, or the house for converted Jews and infidels. It had been placed under the control of the Master of the Rolls in the time of Edward the Second, and an office was at a later date attached to the chapel. Thus rose the record depository known as the Rolls Chapel Office, and the chapel itself became known as the Rolls Chapel. But again the archives began to overflow, this time into vaults in various parts of London, and even into stables. Some documents were put into remote cellars and "murky closets," and were there forgotten.

From time to time this improper treatment of the records was talked about, but nothing was done. Queen Elizabeth, in 1567, becoming aware of the chaos, ordered all the papers to the Tower, but the order was never obeyed. William Prynne, the keeper of the records, petitioned Charles the Second to cause the scandal to be remedied, and a few unavailing efforts were made to clean the papers at least; but even these efforts were soon abandoned. Addresses were sent to Parliament, reports were compiled, and committees sat and talked, as the way of committees is; and meanwhile thieves continued to steal, rain continued to macerate, and mice continued to line their nests with the annals of the British nation. Indeed, not until the beginning of the nineteenth century was it that the work of examining and arranging the muniments commenced in earnest. An Act of Parliament was passed placing the records in the custody of the Master of the Rolls, and the order went forth for the erection of a suitable building. The land adjoining the little Rolls Chapel was chosen, and in 1851 the foundations of the existing building were laid. Seven years later, the travels and adventures of the records were over, and they were brought here to their present resting-place.

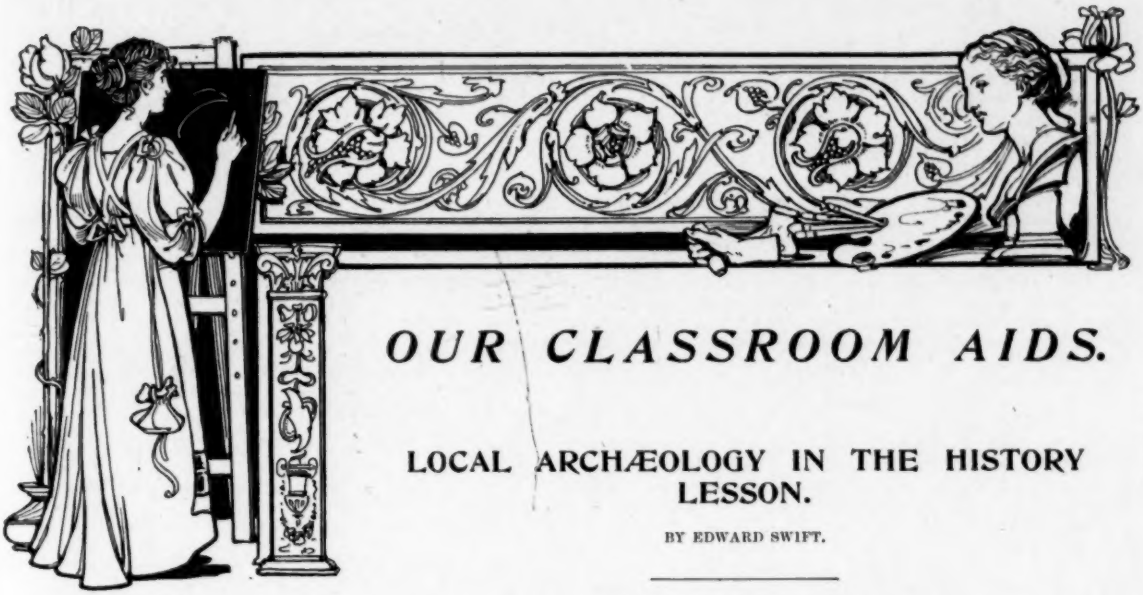
And if the papers from the law courts were thus neglected, what can be said of the treatment of the State papers? These exist from the time of Henry the Eighth, and no more dignified place could be found for them than the chests which stood in the larders of the Privy Seal! Subsequently they were lodged in a tower over the gateway in Whitehall Palace, and thence were transferred to the upper floor of the Lord Chamberlain's lodgings. Later they were bundled into an old house in Scotland Yard. It was not until 1833 that the State Paper Office was specially erected, and by that time the papers had been much reduced in number; for some had been destroyed to serve private ends, and here also rain, thieves, vermin, and dust had been allowed their way. Some years ago a treaty was bought at a public auction, and another was found on a stall in the street. Small wonder, therefore, that collections of important State papers exist outside the Record Office. The library of Hatfield House holds some of these documents. Sir Robert Cotton and Robert Harley, afterwards Earl of Oxford, collected those that are known as the Cottonian and Harleian collections in the British Museum. The universities have secured others, some have fallen to the lot of the library at Lambeth Palace, and most private libraries of any note have been able to secure a few.

But notwithstanding damp cellars, rats and mice, dust and time, intriguers and thieves, the State papers form a very large and a very valuable possession; and they too, with the records from the courts, are now safely housed here under the control of the Master of the Rolls and the working head, the deputy keeper, with his staff of civil service assistants.

From its nature, the Record Office must necessarily be a place more attractive to the historian and to the antiquary than to the sightseer, and its literary and legal search rooms have been the working place of many notable writers. But even the austere Record Office has its indulgent side, and it unbends in a little museum wherein it has generously placed the treasure of the whole collection—the Domesday Book—that starting-point of so many antiquarian excursions. No harassed householder of Upper Tooting, striving to make both ends meet, was ever more querulous concerning the questions of the income-tax commissioner than were the Saxons when the agents of William the First collected the information that has been inscribed in these volumes. "So very narrowly he caused it to be traced out," runs the Saxon Chronicle, "that there was not a single hide, nor one virgate of land, nor even, it is shame to tell, though it seemed to him no shame to do, an ox, nor a cow, nor a swine was left that was not set down."

Domesday Book is in an excellent state of preservation, and in great contrast to a number of documents standing near which have fallen into dust, all but a few remnants of the seals, and a few pieces of the parchment with scraps of writing still to be seen upon them. The log-book of the *Victory*, and the dispatch from the Duke of Wellington describing the battle of Waterloo, make a stirring period live again. One also remembers very early history lessons when the treaty of "the Field of the Cloth of Gold" is displayed, and again do we renew our youth when we have before us the Gunpowder Plot papers with the signatures of Guy Fawkes.

Less known than the British Museum, the National Gallery, or Westminster Abbey, this building, filling the space between Fetter Lane and Chancery Lane, contains truly more links with the past than any other place in the whole city of London.



OUR CLASSROOM AIDS.

LOCAL ARCHÆOLOGY IN THE HISTORY LESSON.

BY EDWARD SWIFT.

THERE is, perhaps, no subject that demands for its effective teaching the setting out of the matter in an interesting and attractive style so much as history. It is essential that this matter be clothed in such a manner that there will be presented to the minds of the pupils vivid images of the facts related.

In rendering these word-pictures more glowing, and more capable of making a deep impression on the imaginations of the scholars, it would be well to consider the value and importance of calling in the aid of the archæology of the school's neighbourhood. For example, reference is being made to a certain war; the pupils are told that a battle, or a skirmish in connection therewith, actually took place not far from the spot where they are at the present moment; that the bones of many of the combatants have been dug up in the fields and meadows they know so well;—and the teacher will note the instantaneous attitude of keen attention, and the glistening of the "wonder-waiting eyes," of his youthful listeners.

All districts are not alike rich in relics of the past, but even in neighbourhoods apparently poor in this respect, the antiquary's searching eye will discover much matter of which he can make use to give "point" and interest to his history lessons. Even the local place-names often tell their tale of bygone ages—the *caster*, *cester*, or *chester* (fort), *coln* (colony), *strat* or *street* (*via strata*, paved way), and *lyme* (haven), survivals of the Roman occupation of this country; the *ham* (dwelling), the *tun*, *ton*, or *town* (enclosure), and the *burgh* or *borough* (fortified mound), traces of the earliest English settlements; and the *by*, *thorpe*, and *thwaite*, indicative of Scandinavian abode.

With regard to the Roman occupation, the district of the school may be traversed by a Roman road, and in that case it would be profitable to refer to it in lessons dealing with that period. Such roads stretch across the country in an almost perfect straight line, showing traces here and there of the original way. In places the road will be found to be commanded by a lofty mound, once a fortress, and in many instances the outer vallum and the fosse (moat) still survive. Many of our ancient roads, too, were originally British saltways—roads or tracks (often following the ridges of hills) leading to places where salt could be obtained. In certain districts we find narrow lanes lying many feet below the level of the fields on either side, and we wonder how many hundreds of years have been taken in wearing them down to their present level. But many such roads do not owe their state to centuries of traffic along them; they were *covered ways*, roads cut so deep that bodies of men might march unperceived through the country.

These artificial mounds of earth, of various shapes and sizes, that are so numerous in some parts of England, are full of interest to the student of history. In British times, or in some instances in ages anterior to those, such *barrows* or *tumuli* were the sepulchral memorials of chieftains or of warriors killed in battle. In many of them have been found weapons and ornaments buried with the corpse for use in a future life.

In dealing with the reign of William the Conqueror, it would perhaps be of advantage to put before an advanced class a translation of the local Domesday Book references, and to supply explanations of certain of the terms therein—such as "hide," "ploughland," "demesne," "villein," and "bordar." Again, a careful demonstration of a particular entry would be the best means of making clear the system of land tenure which prevailed at that period.

What a story of old-time customs and manners can be told by the remains of an ancient castle! The elevated site, the thickness of the walls, the moat, the massive keep, the great gateway with the grooves in the sides of the masonry down which the heavy portcullis dropped in the faces of the assailants, and the barbican or outer tower—all these are eloquent concerning the intestine quarrels and warfare which were so frequent in this land till the close of the fifteenth century.

The ancient and venerable parish church has likewise its tale to tell of olden times. In many examples its tower will be found to possess exceedingly massive walls pierced with very narrow windows, often mere loopholes; such structures, in the twelfth and thirteenth centuries, were often used as parish fortresses in times of strife, and from their summits watchmen would eagerly scan the surrounding country, ready to give the alarm at the sight of the approaching enemy. Within the sacred edifice itself, the tombs, with their recumbent effigies of Crusaders and other warriors, overhung with banners, tabards, helmets, and escutcheons, and bearing quaint and often touching inscriptions, are of great historical value and interest. On the church door, perhaps, there is hanging a massive ring having the appearance of an ordinary knocker. Such a ring, however, has its history: it is really a "sanctuary knocker," and the sight of it carries us back to the times when the shedder of blood would be safe from its avengers whilst holding the "knocker" within his grasp.

Those picturesque groups of ivy-clad monastic ruins which we find in so many parts of our country will serve to remind us of much in connection with the social and intellectual life in England as far as the early part of the sixteenth century. Such buildings served as schools for the young, hospitals for the sick, and hostelries for wayfarers. From their *scriptoria* (before the days of the printing-press) emanated most of the books that were then used. In them were written the records of these abbeys, and also, in many

cases, chronicles of national events, such annals forming the groundwork of the history of the early and middle ages of this country.

There stands, perhaps, in our village or town a structure known as the "Guildhall," often quaint and time-worn in appearance. In considering the origin of such a building, we open a volume in which is written a glowing account of the political and commercial life of our forefathers. The guilds which had their abode in such edifices were, in many instances, combinations of trades-unions and friendly societies. Some of them performed the functions of municipal authorities, while others were simply religious confraternities. Some of these communities, notably at Coventry, busied themselves with the promotion of the "mystery" and the "miracle" plays, which were so common a feature at mediæval festivals.

With the Guildhall is closely connected the "Grammar School of King Edward VI.," which we find established in many of our towns. Several of the guilds were disendowed and suppressed in the reign of Henry the Eighth, the remainder in the period of his successor, Edward the Sixth. With a portion of the confiscated revenues of the latter section the schools bearing the aforesaid title were founded and endowed.

In the centre of the market-place of many old towns we find a "market cross," sometimes whole and well preserved, sometimes more or less dilapidated. Such a cross, besides serving as a station for open-air preaching, stood to remind the traders of the market that their commercial dealings were to be regulated by the dictates of Christianity.

Perhaps in the school's locality there is situated a stately manor-house standing in its well-wooded park. A reference to such a building will serve as a starting-point in considering old-time systems of punishing criminals. A manor-house is a survival of the days when the possession of landed property went hand in hand with judicial authority. A lord of a manor was usually a judge within his own domains, and could fine, imprison, and even hang any of his dependents found guilty of an offence. In later days, the manorial courts, the courts leet, dealt with minor offences only, and in some manors these courts still survive.

In some of our older towns and villages we may find preserved (simply as objects of curiosity) the stocks, the whipping-post, and the pillory; and, in rarer instances, the ducking or cucking stool, in which irate ladies with chiding tendencies were fastened and ducked in the pond or river, and also the brank, an iron frame which securely bound together the jaws of such scolding dames. Such appliances may be profitably referred to as instances of the less humane methods of punishment of past ages.

An English writer of note pityingly refers to the man "who can travel from Dan to Beersheba, and cry, 'Tis all barren;'" but he who has an observing eye and a loving interest in the past may gather, even in the course of his ordinary daily peregrinations, a store of material to be used in the manner here indicated. And to personal research should be added the study of works on the local history and topography, and likewise on architecture, heraldry, and kindred subjects. Such studies will often lead the teacher-student, along many pleasant byways and paths, to that which is most quaint, improving, and interesting.

THE Vice-President of the Committee of Council on Education has appointed Mr. E. Hackforth as his private secretary in place of Mr. R. L. Morant, resigned.

Mr. R. L. Morant has been appointed additional private secretary to the President of the Board of Education.

THOSE who will be visiting Norway or Sweden cannot do better than have in their pocket a copy of *Norwegian Self-Taught* and *Swedish Self-Taught* (E. Marlborough and Co.). They are so arranged as to be of great use to tourists, containing, as they do, travel talk for steamer, railway, hotel, cycle and photographic terms, etc. Cheap edition, in wrapper, 2s. each, and obtainable of all booksellers and tourist offices.

NATURE-KNOWLEDGE.

HOUSE-FLIES AND BLUEBOTTLES.

TO a numerous class of nature students one of the greatest obstacles to progress consists in the difficulty of obtaining material: collection of specimens, the rearing of an animal for the purpose of tracing its life history, means the expenditure of time and care, which many have not leisure to afford. It is for this reason that, in spite of their specialised nature and the repulsion which contact with the vague domain of corruption often inspires, the present subject has been chosen. One of the two insects is with us always, demonstrating the action of his proboscis on some drop of fluid, or dying an instructive death on a window pane. An open window and a little cold meat exposed near it are all that is necessary to cause the other to herald his own approach.

That announcement has both practical and theoretical sides; as to the latter, it provides indirectly a means of determining the rate of vibration of the wings, which are the chief cause of the sound. For the tone of the buzzing, most allow, is just above the note E; therefore the wings producing it must vibrate at the rate of over three hundred times a second—a number valuable, as giving us some idea of the power of the wing muscles.

Let us assume, then, that *Musca vomitoria*, the bluebottle, has laid some of her three hundred white, long-shaped eggs in patches on the meat provided. Their development can be easily watched. In about a day they hatch out white, cylindrical larvæ or maggots, clubbed somewhat at the hind end and destitute of head, though obscurely ringed in structure. For some fortnight more these larvæ will grow, with constant sucking in of the meat juices at the mouth, and constant casting of the skin. Meanwhile it will be well worth while to repeat the historic experiment of Redi. Redi, in order to test the truth of the then current idea that insects arose merely from decaying animal matter, exposed some meat in jars covered with fine gauze. He found that though the meat putrefied, no insect appeared, but the gauze was covered with the eggs of blow-flies. Of this first experimental test ever applied to the question in dispute a full account is given in Huxley's essay on Biogenesis.

The larvæ, after about a fortnight, become more quiescent daily. Ultimately the skin shrivels up and turns a red-brown colour. Within this hard case the adult fly develops, and from it he will ultimately escape by literally pushing off the first few rings or segments of the case. This utilisation of the last larval skin is peculiar to the Diptera (two-winged insects). It is called technically a *pupa coarctata*. Its special feature is that if opened soon after formation it is found to contain, save for some very minute masses of tissue, a milky, loose-textured, semi-fluid substance. The development starts with an animal of simple construction, feeding in the most simple way, and is to end in a powerful insect, with complicated eyes, proboscis, etc. Much change was therefore to be expected; but this wholesale breaking down of tissues to form the bricks to build new, this positive refusal to use up existing organs by altering, is carried to an almost unique extent, and remains a mystery when all has been said. It appears, however, that its life history ran somewhat as follows:—Compared with the caterpillars, its near relatives, it is surrounded by an abundant but brief supply of food. It was hence liberated from the necessity to provide locomotive organs, protective resemblance to twigs and leaves, etc., which bore on the caterpillars. Hence those forms prospered best which wasted least energy on useless sense organs and muscles—in which the muscles, etc., remained undeveloped for the longest time—and finally in which the little structure there was to alter broke down most readily. All of which is stating conditions of success and survival, and leaving causes alone.

The adult insects may be killed for observation by putting in a bottle containing dry potassium cyanide for five minutes. Considerable skill is needed to gain much by dissection, but existence of the silvery tracheæ—air tubes—can be made out, especially in the neck. We will endeavour to deal with a few of the less commonly known external features.

The adult fly feeds on juices—mainly meat juices; the trunk, outspread into its two lobes, is a fairly common microscopic object. It is best to watch it first in action; and any house-fly will demonstrate that this proboscis is applied to dry as well as moist objects, notably to sugar. Tentatively? Possibly; but the salivary glands are exceptionally well developed, and quite capable of making the solution by pouring down saliva on the

food before sucking it up again, after the fashion of extracting salt by pumping water into the salt-pits and brine up again. The structure of the trunk supports this; for the markings on the magnified organ are in the form of two letter F's placed back to back and furnished with many cross strokes, every line of which turns out to be a deep groove, connected with the two main grooves which lead back to the head up the stem of the trunk. These might conduct fluid either way.

The great compound eyes are handsome, even without a lens. The cuticle can be stripped off, and found to consist of vast numbers of lenses, by the use of a microscope, fairly easily. Very interesting, also, is the group of three knob-like bodies placed at the very top of the head. These are the ocelli, each a simple eye. In what way they differ in function from the large eyes is unknown; possibly they have a greater range. In *M. vomitoria* especially stout hairs are about them, and curve away in symmetrical lines from them. These hairs will be found, on examining many specimens, to be constant in disposition. The careless flight of insects possessing these hairs, leading them to dash against obstacles, has given rise to the suggestion that they are protective. Perhaps, however, the more discreet house-fly is already feeling the sophisticating effect of civilisation; for Mr. Butler has pointed out the curious fact that *M. domestica*, the house-fly, lives very largely indoors, but deposits eggs in stable refuse (which accounts for the somewhat small number of people who have seen the eggs), while *M. vomitoria* conversely lives in the open air. This brings us to the remaining feature of the head. It appears to be the two antennæ, placed on the front of the head, which guide the blue-bottle to its meal, and the claim it wishes to stake out for its posterity; for the antennæ of an ant are essentially similar, and an ant, to whose antennæ a quill was quite innocuous, drew back in alarm when presented by (the then) Sir John Lubbock with the same quill dipped in various scent.

Being concerned mainly with externals, the abdomen presents little of importance, but the thorax has some noteworthy features. The chief is the presence of two wings only. This places the *Muscæ* in the family Diptera. The wings are strengthened by a stout and spined front border, and by vein-like thickenings called nervures. The latter can be used as a means of classification. It will be seen that the nervure of the bluebottle's wing which reaches nearest to the tip possesses a right-angled bend. *M. domestica* has a far wider angle. Correlated with this development of wing is the fact that of the three thoracic rings or segments, the middle one, on which the wing is seated, is far the most developed. Behind the wing is a small knobbed projection; that it is the reduced second wing seems plain from its position. Its function is unknown. It can be far better seen in the crane fly. A comparison between creatures not habitually flying—any common beetles or ants—and the Diptera will make the emphasis of the middle thoracic segment in the last obvious.

The ease with which flies walk on smooth surfaces, once supposed to be due to suction, can be seen on examination to be due to a sticky fluid, poured from a minute aperture in each foot, and remaining for a second on the end of the hollow hairs of the foot. Thus the fly leaves minute gum-like footprints, hard and dry, behind him, unless, being in the last stages of exhaustion, he is unable to free his feet, and the liquid sets and fastens him to the pane. It is a curious fact that the flies overtaken by this fate are nearly always those which have perished from the attacks of a minute fungus, whose spores, thrown out from the victim's body, make a filmy halo on the surrounding glass.

OASES.

THE word "oasis" is generally defined in geography books as "a fertile spot in a desert." Some authors go so far as to supplement this with the information that a spring or well and a few date-palms are to be found there. The idea formed from these descriptions is entirely false. A better definition would be, "Oases are huge natural excavations in the desert plateau," and the extension, "Springs are generally numerous, and just sufficient cultivation is carried on to support the population."

The Geological Survey of the Egyptian Government have now made careful investigations of several oases situated on the east of the Sahara Desert. The principal oases of Egypt are Siwa, Baharia, Farafra, Iddaila, Kharga, and Dakhla. These, of course, differ very considerably both in size and fertility. The Kharga Oasis is about three times the size of the Isle of Man. The Farafra depression is about 120 miles from north to south, and 56 miles from east to west. The Iddaila Oasis is probably as large. The Baharia and Dakhla Oases are both large, but the Siwa, though important, is not so great. The oases generally have high escarpments, sometimes of chalk of dazzling whiteness, which are often broken in the north. The rocks are mostly of the Cretaceous period, and the lower clays carry the water from the Nile Valley and pour it into the oases in the forms of hot, cold, mineral, or gaseous springs. Blown sand is a very destructive agency to cultivation. It is continually changing its position, and in some parts covers Roman remains or once fertile lands. The prevailing winds are N. and NNE., and are often bearers of violent sandstorms.

The springs may be grouped into three classes—(1) overflow springs; (2) stagnant; (3) sanded up. The overflow springs alone are used in cultivating the land. These generally issue from little eminences, and are found as high as 260 feet above sea-level. They are sometimes brackish, vary in temperature, often contain iron and carbonic acid gas. The lower parts of the oasis, sometimes on sea-level, are the only spots cultivated, for the people use no levers or any articles whatever for lifting water. So great is their antipathy to labour that, even should a pool be only one inch below the level of the ground, they will never draw from it for watering. The stagnant pools, therefore, are not used except for washing clothes in, and for drinking purposes if more conveniently situated than a running stream. The sanded-up springs are the result of the blown sand. To clear them it would only be necessary often to bore for a yard or two, or even to push a piece of piping down the bore; but this is never done, owing to economy of effort. The survey party state that streams have been led for more than a mile, in order to cultivate land in the middle of which, perhaps, stands a sanded-up spring which a stick-probe would probably start, or a pool of water but a few inches below the ground-level. Springs are taxed by the government according to their outflow. The charge works out to about a penny for each thousand cubic metres of water. The taxes collected from the Kharga Oasis on the running springs amount to about £160 sterling. Farafra has about twenty good springs against two hundred and two of Kharga. The quantity of water, though influencing the amount of cultivated land, greatly influences the climate, and, as a result, the people. The oases abundantly supplied with water have much swampy land and marshes, and fever and malaria are very prevalent, especially in summer and autumn. Those like Farafra, with fewer springs, enjoy very good health, particularly if also open to the cooling winds. The population of the Kharga Oasis is about eight thousand, but the people are described as lazy and ignorant. Full of complaints against the government, they cannot even reason out the simplest facts. As an example, it is said that the Egyptian Government, in answer to their long and loud demands, sent them boring apparatus to open new wells. They actually in one place bored to a depth of 120 metres, when within a few yards were old wells which wanted clearing out for a metre or two only. In excuse it is said that the fever carries off many victims and weakens others. The physique generally is low. The whole life of the oasis wears itself out. There are no fertilisers in use; even the water is not like that of the Nile, which brings down its vegetable mud. The soil, like the people, is simply degenerating. Although in some parts clays of good manurial value are to be found, nothing is done to utilise them. The people live on the least amount of food, labour, and reasoning possible. Contrast the Farafra people, who are business-like, quiet, well-disposed, and, although fellaheen like the others, take their dates and a few olives in caravans to the Nile Valley.

The amount of cultivated land per head works out to about half an acre. The crops are wheat, barley, maize, rice, onions, and a few fruits. In all the oases the dom and date palms seem to be very abundant. The latter are taxed about fourpence each. Even at this low rate the Kharga Oasis brings in £950 sterling—representing 60,486 trees over three years old. Farafra was formerly well known for the quality of its olives. Following the course of nature, however, the trees now refuse to bear, owing to the repeated impoverishment of the soil. The crops now are scarcely more than sufficient for the population. If the people would only return to the soil the fertilisers necessary to make up for what the fruit has absorbed, the trees would without doubt yield once more sufficient for several caravan loads of export to the Nile Valley. An arboricultural curiosity, well illustrative of the hatred of work of the fellaheen, is to be seen at one of the springs in the Farafra Oasis. Here the date-palms, instead of being tall, bare trunks, with clumps of leaves at the top, are untrimmed, and bear leaves and *branches* throughout the stem.

The animals found are the gray fox, snakes, beetles, insects in abundance, vultures, a few butterflies and moths, and gazelles. The Arabs keep, besides, the usual domestic animals. The

average mean atmospheric pressure of Kharga for the end of May was 749, and the temperature in the shade 71° F. at night, and 104° F. at 3 p.m. The humidity, at a distance from wells, was on an average 9·6. The oases are presided over by an omdeh, who is sometimes helped by a second living in another village. A government doctor is sometimes provided. Officials are sent yearly from the various provinces to which each oasis belongs to collect the taxes for the government.

Most interesting of all the information about the oases is the early history, and there is no doubt that a knowledge of the traditions and legends would be of intense interest. Much has already been learned. From a stela found at Luxor, it was discovered that oases were used from very early times as places of banishment. Ptolemaic inscriptions in the temple at Edfu contain references to seven oases, Kharga and Dakhla being united under the name of the "Great Oasis." In the oases themselves are many ruins, and the remains situated north of the present village of Kharga show that Hibis was one of the principal towns. Sculptures on the walls represent a king presenting wine of the oasis to the gods. Later inscriptions refer to governors and taxation. South of the same oasis are remains

THE EGYPTIAN OASES.

of temples and ancient towns. Of Roman remains there is an abundance. During the Roman occupation of Egypt, garrisons were kept in strongly-fortified castles in commanding positions of the oases. Lookout stations, aqueducts, wells, tunnels, and remains of cultivation requirements are very abundant. The Farafra shafts in many wells are probably of Roman origin, and being timbered or walled, can be cleaned out by divers, of whom there are several in the oasis. In Christian times, Bishop Nestorius was banished to Kharga for his religious opinions, and the strong ruins would tend to prove that, as in other parts of the country, Christians were persecuted and had to defend themselves. The Christian graveyards and tombs show that the "key of life," and not the cross, was adopted as the symbol of these early Christians. The mummy cloths found in the tombs show that the practice of embalming was carried on well into Christian times. The poorer Christians seem to have been buried several together, in tombs cut out of the rock. The great Christian necropolis is situated about three miles north of the village of Kharga, and the remains, situated on a hill, are a beautiful sight. One tomb has escaped the desecration of the Arabs, and its dome is painted internally in many colours with the following pictures, each having a Greek inscription:—(1) Adam and Eve; (2) Abraham, Isaac, Sarah, the ram and sacrificial altar; (3) Irene; (4) Daniel and the lions; (5) Justice and scales; (6) Christ; (7) Isaiah (?); (8) Noah, ark and dove; (9) Maria; (10) Paul; (11) Thekla. In the corners of the tomb are painted four figures of fowls.

A brief description of the four more important villages of the Kharga Oasis will give an idea of their present condition.

Kharga—population, 4,813; date-trees, 44,042; wells, 105; total taxes, £790—is situated north of the centre of the oasis. The houses are of mud-bricks, and the streets very narrow and almost entirely covered in. There are no shops, buying and selling being done from hand to hand. The area of the village is 65,000 square metres, and it has two minarets. It has several large palm-groves. Being the seat of government, it is the residence of the chief omdeh and the government doctor. The area under cultivation is 1,406 acres.

Gennah—population, 434; date-trees, 3,271; wells, 8; total taxes, £62—is 11½ kilometres south-west of Kharga. It has tunnel-like streets, and small but dense palm-groves. One pool three metres deep has a temperature of 85° F., and is of a clear bluish-green colour. It bubbles with carbonic acid gas, and has iron salts which deposit hydrous-ferric-oxide on the stones and twigs in the small brook into which it swiftly issues. Another spring of the same temperature is clearer and purer, and flows into a narrow canal to be used for irrigation.

Boulag—population, 838; date-trees, 8,440; wells, 31; total taxes, £150—is only three metres above the sea-level. It is 25 kilometres south of Kharga, and 60 north of Beris. Four miles south is the tomb of Sheik Khalil, which presents a strange appearance. Its exterior is whitewashed, whilst the tomb is covered with red cloth worked with Arabic texts, its inner walls with gaudy native prints, and its floor with mats.

Beris—population, 1,407; date-trees, 4,733; wells, 58; total taxes, £100—has a warm, green, bubbling spring, banked up above the surrounding land. It has the barracks where soldiers were stationed after the Dervish raid in 1893. About 900 yards south is a pool of bubbling cold water.

It is to be hoped that the Report on the Dakhla Oasis will soon be published, and surveys be made of the others. Geologists, botanists, and archæologists are now making most useful observations, and publishing their reports in book form.

Chambers's English Manuals: Books I. to IV. These manuals have been specially prepared to provide a systematic and carefully-graduated course of instruction in English, in accordance with the suggestions of the Board of Education in the schemes of instruction, and we are fully persuaded that they will satisfy every legitimate demand in these subjects.

The order of Book I. is as follows:—1. Groups of words of similar structure given to copy and learn. 2. A transcription exercise embodying these words, and teaching the child their use. 3. Simple questions requiring a short sentence for an answer. 4. A transcription exercise differing from 2, in that its sentences are linked together to form a simple theme.

Further on, predicates are omitted in the text, and the child is required to insert them. These are varied by sometimes demanding a verb in the singular and sometimes a verb in the plural. In some exercises the child has to change an assertive sentence into an interrogative. Subjects and objects are omitted in other examples. Word-building is also introduced.

The same method is followed in Book II., the difficulties being proportionate to the increased capacity of the child. The author has been careful not only to give an abundance of word-building, but to introduce some of the commonest rules of English spelling, such as the dropping of the final *e*, changing *y* into *i*, and dropping one *l* on the addition of a syllable.

In Book III. the method is practically the same, additional difficulties being introduced, such as the proper use of the relative pronoun, etc. In the composition exercises the child is supported by suggested ideas, as, for example, in an exercise on the mouse, he has furnished for him "small animal," "covered with fur," "large, round eyes," "large ears," "teeth sharp," etc. Summaries of seventeen stories are put before him to be read through twice and then reproduced. This is an especially useful and valuable manual. The skill shown by the author in leading gradually to the reproduction of a simple anecdote in the child's own words is worthy of much praise.

In Book IV. we are not struck with the value of the exercises on the first two pages, which require a pupil to arrange such a passage as, "River in the swim large fish," in proper order. The rest of the book is well arranged, and the child is brought face to face with the functions of the different parts of speech by means of composition exercises. Besides a dozen capital stories, this part has twenty-four exercises in word-building.

A COURSE OF OBJECT LESSONS FOR GIRLS' SCHOOLS.

BY WILLIAM DONE, B.A., HEAD-MASTER OF BRIGHTON PUPIL TEACHERS' SCHOOL.

XXVII. LEATHER.

Articles of Illustration.—Small pieces of sheepskin and ox-hide, which may be got from the butcher's shop; an old kid glove; the inside band of a man's hat; specimens of morocco and Russia leather, as found in purses and card-cases; a piece of new sole leather; "chamois" leather; some ordinary alum and oak bark; some lime-water with a piece of ox-hide placed in it some days previously.

HEADS.	TEACHING.
The true skin, scarf skin, hair.	Show the diagram used in the last lesson on the skin, and recall to the children's minds the chief characteristics of the scarf skin and the true skin.
Skins and hides.	Show the pieces of ox-hide and sheepskin. The skins of large animals are usually termed hides, as those of the ox, cow, horse, elephant, hippopotamus.
Ox-hide and the leather from it compared.	One piece of ox-hide from the butcher's shop perhaps smells badly, showing it is putrefying. Another piece, which has been dried, is hard and horny. The piece of leather is much thicker than the hide; it is of a brown colour throughout; it bends easily. We know that boots made of leather will keep out the wet, and they last a long time. Leather is of an even texture throughout, and has no hair upon it, so we infer that the hair and the scarf skin have been removed.
The process of turning hide to leather outlined. *1. Scarf skin and hair removed after steeping in lime-water.*	Show a small piece of ox-hide which has been soaking in lime-water for about a fortnight. It will be seen that it has swollen considerably, and the hair pulls out easily, showing that the lime-water has loosened the roots. The outer scarf skin also can be scraped off with a knife very readily. In the actual process the hair is also scraped off with knives, and sold to builders to mix with plaster for ceilings.
2. Hides soaked in weak acid solution.	To stop any further effects of the lime on the hides, they are dipped into a weak solution of an acid, such as sulphuric acid. The acid not only removes all traces of the lime, but still further causes the skin to swell and the pores in it to open.
3. Tanning.	Show pieces of oak bark. Place some fragments, previous to the lesson, in a glass of water. Let a girl dip her finger into the bark solution and describe the taste. Compare with the taste of acorns, and also with strong tea which has been boiled or has stood in the teapot for a length of time. The peculiar rough, dry taste in all these substances is due to an acid called tannic acid. The hides are placed in tanks or pits, in alternate layers, with oak bark, and the pit is filled with water. The tannin is drawn out by the water, and soaks into all the tiny pores, and into the entire material of the hide, completely changing its nature, and turning it into leather. The time required depends upon the thickness of the skin, amongst other things, and may be several months. Show specimens of leather which have not the brown colour, such as gloves, etc. Ordinary skins are usually changed into leather by soaking them in a solution of alum and salt. Such substances are called *tawed* leather, and are softer than ordinary boot leather.
Varieties of leather.	Show the various specimens of leather provided for the lesson—kid gloves made from tawed sheep or goat skins; Russia leather, tanned with willow bark and curried with oil from the bark of the birch tree, which gives it such a pleasant smell; morocco leather, made from goatskins, and dyed red perhaps with cochineal; wash leather, usually called chamois leather, though now made from sheepskins, not tawed, but treated with oil instead of alum.
Importance of the leather industry.	Let the girls name the chief towns and districts in England connected with the leather industry. In the year 1900 England exported leather and leather goods to the value of nearly three and a half million pounds.

XXVIII. FUR.

Articles of Illustration.—A fur muff or boa; a piece of sheepskin with the wool on it; a cat; a dog; a picture of a hedgehog; a small piece of dressed sealskin.

HEADS.	TEACHING.
1. Various coverings of animals: *(a) Hair.* *(b) Wool.* *(c) Fur.* *(d) Spines.* *(e) Scales.* *(f) Feathers.*	Compare by sight and touch the coverings of the dog, the sheep, the cat. Note in the picture and from the girls' memories the coverings of the hedgehog, porcupine, herring, birds. Elicit the use of such coverings, and the reason man's skin is so bare. Recall to the girls' minds the lesson on the skin. We learned that hair was made of horny cells of the epidermis or scarf skin; hence we infer that wool, fur, etc., are varieties of the same substance.
2. Examination of the cat's coat, and comparison with fur muff, etc.	Let the girls find out by handling the cat that its coat really consists of two parts. There is an outer covering of long, straight, smooth hair, and an underneath coat of very fine, soft, curly hair. Note that the dog has not this fine undercoat. Tell the class the use of the over-hair—namely, to prevent the fine hair beneath becoming matted, owing to its barbed filaments linking together. The over-hair is smooth, and has no tendency to mat. Contrast the cat's coat with the specimens of fur provided. In the case of the piece of sealskin we find no over-hair, now it has been dressed.
3. Why fur feels warm.	As the girls examine the fur articles, placing them perhaps against their cheeks, besides finding out that fur is soft and comfortable, they will also say that fur feels warm. Recall to their minds the lesson on Heat and Temperature. Fur feels warm because it keeps the heat of the body from passing away. Contrast with the action of a slate held against the face. We can understand the utility of wearing such articles in winter, especially over parts of the body like the neck and hands.
4. Dressing furs.	Show the underneath part of a piece of dressed fur. Compare with a piece of raw skin. From the previous lesson on Leather the girls will see that the skin has been *tawed* into a kind of leather, in order to preserve it, and also to render it supple. As in the case of leather, this has been done by steeping the fur skins or pelts, as they are called, in a mixture of alum and salt and water.

Heads.	Teaching.
	Call attention again to the piece of sealskin. We found in this case that the over-hair had been removed. This hair, being stronger and thicker than the under-hair, has its roots deeper in the pelt. The furrier scrapes the bare side of the pelt until he just loosens the long hairs, so that they can be easily pulled out.
5. Care of fur articles.	The girls will know that the utmost care has to be taken to preserve furs from the moths. In summer furs should be wrapped well in brown paper, with a piece of camphor or other substance distasteful to moths. Fur articles should also be kept dry; damp soon turns them mouldy.

NOTES AND JOTTINGS.

When, at the beginning of the reign of Queen Victoria, University College, London, was founded to provide a university education without denominational teaching, King's College was established as a sort of protest, and its founders considered that a religious test was necessary to safeguard their scheme. Now, however, the council, by a majority of twenty-two to two, has passed a resolution declaring "that, in view of the University of London Act of 1898, every religious test as a qualification for office, position, or membership in or under the council or college, with the exception of professorships or lectureships in the faculty of theology, shall, as soon as may be, cease to exist." The Bishop of London, who is chairman of the council, publicly declared that there is no incompatibility between such a resolution and the maintenance of the connection of the college with the Church of England, and he felt sure that the college under the new conditions would even "increase in the future her output of men equipped to do the work of the church." This change in the organisation of King's College reminds one of the abolition of tests at Oxford and Cambridge Universities; but in the latter case the change was brought about by parliamentary forces, and against the wishes of the majority of those who directed the affairs of the universities. In this case the change is from within, and we quite think that the bishop was right in maintaining that the church and the college have nothing to fear from the change. But, if this policy is wise in the case of King's College, how much more strongly should it appeal to the authorities of our training colleges. Surely these colleges stand to lose by maintaining religious tests. The numbers clamouring for admission to undenominational training colleges should surely be taken as a proof that candidates desire to enter training colleges primarily to become qualified as teachers; and we trust that the councils of denominational training colleges will follow the good example of the council of King's College, and abolish tests, not from compulsion by outside forces, but as an act of grace from within. If the attendance at religious observances were made optional, we could echo the Bishop of London's remarks, and feel assured that these colleges would increase their output of really earnest men to do the work of their respective churches.

Sir Oliver Lodge, in a letter to *The Times*, discusses the two modes of encouraging the spread of university education. One mode is the scholarship method—namely, to pay the expenses of students, and so enable large numbers to attend existing places of instruction, leaving the equipment to chance, and making it necessary for the authorities to make appeals for help. The other mode is the equipment method—namely, the provision of the best possible educational appliances and the highest grade of university professor, and then leaving to the students, automatically attracted from all parts of the world, the onus of providing for their own fees and maintenance. The writer seems to have a preference for the second method. But it seems to us that both modes should be adopted simultaneously. It is as useless to equip a place and leave it out of the reach of students as it is to send students to an institution which is not properly equipped. The "pious founder" who spends all his money on equipment is really providing for the rich only, and his endowments are quite useless as far as regards the intellectual student without means. By all means we would see those who have money enabled to obtain the very best of intellectual value that their money can procure, but side by side with them we would see working those whose high mental powers would fail to find scope for their fullest development without pecuniary assistance. The difficulty seems to arise from the rise of local patriotism, so to speak, which is anxious to aid local talent, which it does by means of scholarships, but either fails to see that local talent is aided indirectly by equipping university centres, or else is too jealous to provide benefits which can be enjoyed as well by people from other parts.

A correspondent in the north writes on the subject of illustrated composition:—"As a Scotch teacher, may I be allowed to add my testimony to the value and use of pictures as an aid to composition. In 1897 we began regular composition lessons in Class 2 by use of large pictures pinned to blackboard. Answers were got to questions about the picture, and the sentences were written out by the pupils. I developed the idea further by cutting out coloured pictures from some sample pages of a series of readers sent, and mounted these on cardboard, and varnished them. Each child then got a picture to himself, and the results were most gratifying. Children of seven and eight years of age were able to make original sentences, and in cases to write a short story on the picture subject. As your English correspondent says, the composition lesson was as interesting as the manual training hour. We do not use pictures beyond Class 3, but I have found that, beginning in this way, children of ten can do well what was only done with difficulty by pupils of eleven and twelve.

"I am glad to hear of a series of suitable pictures, and would further advise that they be put on cardboard, so that they could be used again and again, while those pictures with gummed backs might still be useful for examination or show purposes.

"No teacher who tries this method, I am sure, will ever regret the change, but rather will wonder at the pleasure composition becomes when associated with well-coloured and suitable pictures."

The Board of Education have approved the appointment by the Teachers' Registration Council of Mr. G. W. Rundall as their registrar.

Mr. G. W. Rundall, who is an M.A. of New College, Oxford, was a master at Marlborough from 1877 to 1891, and head-master of the High School, Newcastle-under-Lyme, Staffordshire, from 1891 to 1900. He is a member of the Head-Masters' Conference, and of the Incorporated Association of Head-Masters, and chairman of the West Midland Divisional Committee of that association. He is also a member of the Political Committee and of the Educational and Library Committee of the Teachers' Guild. During the past year Mr. Rundall has been an occasional inspector of secondary schools for the Board of Education. He has also acted as an examiner for the Oxford and Cambridge Joint Board and for the Civil Service Commission.

The Cambridge University Press announces that the first volume of the *Cambridge Modern History* will be published on November 1. This work will mark quite an epoch in the making of histories. It was planned by the late Lord Acton, who laid down the general lines, and secured the assistance of the ablest historians of the present day in dealing with the details. From the prospectus before us, we feel sure that the work is neither a collection of disconnected essays nor a mere work of reference, but will combine the interest of the former with the accuracy necessary in the latter, while at the same time there will be a due proportion maintained between its several parts. The work will be published in twelve volumes, which will deal with and take their names from those great epochs and movements which go to make up modern history—namely, the Renaissance, the Reformation, the Wars of Religion, the Thirty Years' War, Bourbons and Stuarts, the Eighteenth Century, the United States, the French Revolution, Napoleon, Restoration and Reaction, the Growth of Nationalities, and the Latest Age.

"Coronation Day," June 26, was marked by the publishers of *Commercial Intelligence* by the issue of a special number, which, in sixty pages, each twice the size of The Practical Teacher, gives a very full account of the "Building of the Empire" and of its condition at the present day, particularly from a commercial point of view. We know many teachers who regularly subscribe to this weekly paper, and who are able to add immense interest to their geography lessons by this means.

The Practical Infant-School Teacher.

OUR MODEL INFANTS' SCHOOLS.

X.—HASELRIGGE ROAD, CLAPHAM, S.W.

THIS school has changed in character during the last year or two, and, strictly speaking, is not an infants' school, inasmuch as children under five are rarely admitted, and those in the school are not drafted into the senior departments until they have completed a Standard II. course in the junior. The main purpose of the school is to prepare thoroughly for admission to these senior schools, and in order that there shall be no break between the methods and work of the different departments, special attention is paid to, and special arrangements made for, this continuity of treatment. The educational world lately has been much concerned with the question of the true co-ordination of its various branches—primary, secondary, technical, etc.—and there has been much talk of the educational ladder leading from the primary school to the university. To those actually engaged in the work of teaching, it must be obvious that there exists to-day, in many cases, a pressing necessity for the true co-ordination of the different stages of primary education. How frequently it happens that an infants' school is conducted without any thought of its connection with the classes for older children! and how often one hears that the lower classes in the senior school, recently promoted from the infants', have been taught the rudiments of reading, writing, arithmetic by methods quite different from those adopted in the upper school—methods not necessarily inferior, often the reverse, but nevertheless attended by a waste of time and energy, if they are to be replaced by different methods when promotion occurs. And how easily this might be avoided by a little previous consideration and arrangement only those who have tried it can possibly know. Regarded, therefore, as a preparatory department, the above school may well be selected as a model, among those most ready to admit this classification being the teachers of the senior departments.

The building presents no special features, its central hall and large classrooms being repeated in nearly all London Board Schools. The staff consists of the head-mistress, with a certificated assistant for each classroom. The number of children present when the school was visited was 511, and so full is the school that application for admission is usually made twelve months before admission is possible. One of the chief reasons for this state of affairs is the character of the work done. There is throughout an entire absence of anything of a "showy" kind. H.M. Inspector, in his last report, says: "The school is showing excellent work all round, the methods throughout being sensible and effective. Drawing and colour work are exceptionally well executed, and singing calls for a word of special praise." The head-mistress hastened to explain that the results indicated above were largely due to the excellent character of the staff, and the freedom enjoyed by each member owing to the method of organisation. Each teacher begins at the bottom of the school, and keeps the same children throughout their junior school life. This gives an opportunity for formulating complete courses of instruction. Each teacher adopts her own plans, and draws up the necessary scheme of work for each month or term, which she submits to the head-teacher for approval. This preserves uniformity in general methods, while allowing scope for individuality in matters of detail. For example, in the teaching of writing the final aim is to obtain a style in vogue in the senior school, and there is no possible deviation from this; but the necessary preliminary stages leading to this result are left to the initiative and discretion of the various teachers. For this purpose slates are used in the lowest classes. These are ruled for text handwriting. Discussing the question of slates *v.* paper, the mistress considered that more rapid progress was possible with the former. As a good style of handwriting is due to repeated practice of model forms, and it is easier for a child to correct a wrongly-formed letter on a slate than on paper, perhaps she was right. As to the greater cleanliness of paper work, this was discounted by providing each child with a sponge when slates were used, and insisting on their complementary relationship. The classes immediately below Standard I. use paper and ink, and write half-text, while Standards I. and II. write small hand, as in example shown.

In these upper classes plenty of practice is afforded by means of copy books (without headlines), together with dictation and composition exercises. There is a suspicion abroad that, since the abolition of the annual Government examination, the ability to spell correctly has diminished considerably in the rising generation, and opportunity is frequently sought to prove this suspicion a certainty, by those who regard the new order of things as inferior to the old. It is admitted on all hands that correctness of spelling is an essential item in all educational schemes, the point in dispute being the best method of obtaining it. As an experiment the following plan is in use in this junior school:—

Each week the five upper classes prepare an exercise for dictation which is given out by the head-teacher, who also corrects and returns it. This is a source of pleasure to all but a few children who seem to have no idea of the sounds of words; but even they do a fairly respectable exercise, as the mistress suggests, because of a good memory. At the quarterly examination a paragraph is arranged, containing the more difficult words from these weekly prepared exercises, and is given without further opportunity for revision. The results show that real advance is being made by the children in this subject, and the teachers are very hopeful of its success when promotion to the senior school takes place. The following extract shows the kind of weekly test given, and the style of handwriting in use, the paper being selected casually from those worked by Standard I. during the week this visit was made:—

Every one in Japan is very polite. When a boy is sent to a house with a message, he leaves his wooden shoes at the door before entering. There is no bell or knocker, but he gently pushes aside the sliding paper door, and softly calls out, "Excuse me".

Conrad. 4.

The teaching of arithmetic deserves special notice. All the earlier attempts with numbers are dependent upon concrete illustrations, and the simple operations of addition, subtraction, multiplication, and division are combined whenever possible, as in the following example:—I have 7 pennies in one pocket and 3 in another; how many have I altogether? If I spend 2, how many are left? To how many friends could I give 2 each? If I put 4 aside for myself, and give the remainder to 4 friends, how many would each receive? And so on. In teaching addition and subtraction, the children learn to combine the numbers to form tens as far as possible—for example, (1) 5 + 3 + 7 + 6 would be taken in this way: 7 and 3 make 10, 5 and 5 make 10, 10 and 10 are 20, and the 1 over from the 6 makes the total 21. (2) 4 + 2 + 4 + 9 + 3 would be added thus: 4 and 4 are 8 and 2 are 10, 9 and 1 are 10, 10 and 10 are 20, and the 2 over from the 3 makes the total 22.

After a short time the possible combinations of numbers to make 10 are recognised at a glance, and addition is very rapidly and accurately performed. Subtraction being dealt with as complementary addition, the same method is utilised. At a later stage, when compound rules are met with, the same principle holds, and a child who has had practice as above readily groups pence into shillings, shillings into pounds, etc.—conclusively proving the advantage of continuity of method. To facilitate this rapid grouping into tens, Tillick's bricks are used. These consist of cubes of one-inch edge in various combinations. There are single cubes, groups of twos, threes, fours, etc., up to ten, and by means of these the method is easily illustrated. Other objects, as beads and sticks, are available for the same purpose, but the advantage of the first named is their special adaptability for this particular method of working.

Reading.—In this subject every possible system has been tried, and each teacher is at liberty to adopt any method or combination of methods likely to produce good results. Owing to the arrangement by means of which each teacher goes from the bottom to the highest class with practically the same children, by the time the school course is finished the reading has passed beyond the mechanical stage, and the majority of the children read fluently from a third standard book. Generally speaking, the teachers rely on simultaneous reading in early stages, with spelling, analysis of words, and word-building, and, as progress is made, plenty of individual reading for expression.

In order to avoid monotony and lack of interest in the subject, the upper classes are trying the experiment of reading through a fresh book every month, and so far with very encouraging results, Standard II. now using Standard III. readers, and Standard I. those of Standard II.

Object lessons are given twice a week to each class. These are taken from schemes prepared at the commencement of each year, and are made as suitable and instructive as possible, attention being paid to the character of the school and the needs of the children.

Music and recreation hold an important place in the school curriculum. In addition to a set lesson in physical exercises for each class during the week, ten to fifteen minutes are given every morning to simple movements, easily performed in the various rooms. Every morning and afternoon ten minutes are allowed for recreation in playground, the children marching from their classrooms to the strains of the piano—a very necessary precaution when one considers the time that would be occupied by five hundred infants moving at their normal rate of locomotion from classroom to playground and back again.

The Tonic Sol-fa Notation is taught throughout the school, and by its means the children soon acquire a readiness in reading simple melodies, such as hymn tunes, at sight. The singing of hymns is quite a feature of the school. Each day the head-mistress takes two classes in the hall for this purpose from 9.5 to 9.40, so that by the time the children leave this department they know quite a number of hymns, which are carefully selected with a view to their helpfulness at all times. A certain religious body is credited with saying: "Give us the first seven years of a child's life, and you may have them after; they will come back to us in the end." Having considerable faith in this sentiment, the mistress arranges for personal contact with each child, as mentioned above, and endeavours, by means of hymns and passages of Scripture, to provide material that shall beneficially act on their characters after completing their first stage of school life.

The drawing done here claims special attention. As H.M. Inspector observes in his report, "drawing and colour-work are exceptionally well executed." My visit occurred, fortunately, on a day when the classes were engaged with this subject, also during the week immediately preceding the one originally fixed for the Coronation. As a result, crowns, orbs, sceptres, Union Jacks, etc., were in evidence everywhere—some as freehand, some as freearm exercises, and others affording opportunities for some very fine colouring effects. In order to get some idea of the complete scheme, leading from the straight line to very elaborate original designs, the work done by one mistress in passing from the lowest to the highest class was taken, and through her great kindness in providing details, is sketched here fully. The method has been proved practically to be sound and effective, and may be confidently recommended to other teachers who have to deal with this work.

The mistress says:—I do not claim that it is entirely new, but I have utilised and combined the methods of one of London's best kindergarten exponents, together with the knowledge gained from an able designer; whilst a third art master, good text-books, and an intense desire to make the little ones see beauty in everything around them (especially in field and wood) have all helped to elaborate my plan.

Speaking from six years' constant experience, I can confidently assert that the subject has been a welcome one to both teacher and scholars, in some cases stimulating even very backward children to better effort in other subjects.

From the earliest lessons the following rules are strictly kept:—

1. Absolute cleanliness of everything connected with the lesson, dirtiness being condemned rather than faulty work.
2. Use of india-rubber and patching up of copies is never allowed.
3. Copies rarely, if ever, repeated on the same day in exactly the same form.
4. Use of symmetrical forms to cultivate a sense of what is beautiful.

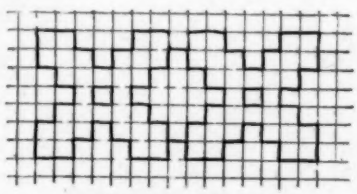
FIRST STAGE.

Suitable for children of four and five years. The children being only just able to hold the pencil properly, should be given confidence by the use of the half-inch chequered drawing *slate* in place of the three-eighth inch, until lately in vogue.

Group I. Slate Drawing.—

(*a*) Vertical and horizontal lines not joined.

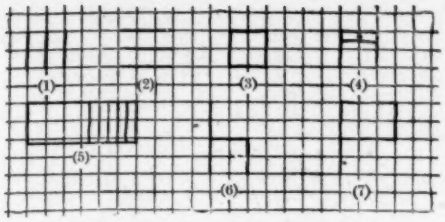
(*b*) Simple patterns formed from similar lines by joining, giving scope for conversational lessons upon right angle, square, cross, etc.



SIMPLE FLOORCLOTH DESIGN.

Paper Drawing.—The same series of copies on similar chequered paper alternately with slate exercise.

Millboard Drawing.—To be taken side by side with other drawing through each class. Some teachers have allowed this to supersede slate and paper drawing almost entirely, but in this scheme, although used freely, it does not replace the other forms. The rapid strokes which illustrate many a lesson during the week may be copied on millboards with great advantage. Also, in this stage, with coloured chalks as an encouragement, strokes may be made to represent various simple objects, as shown in accompanying sketches.

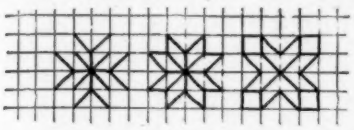


SUGGESTIVE MILLBOARD SKETCHES.

1. Cricket Stumps. 2. Bars of Grate. 3. Box. 4. Table with Drawer. 5. Rabbit Hutch. 6. Chair. 7. Flag.

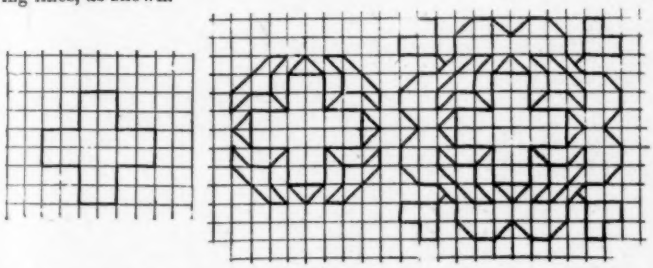
Group II. deals with true slanting lines (*a*) not joined, (*b*) joined.

In this group star elements are arranged to form surface designs.



(*a*) Separate, side by side, or diametrically.
(*b*) Diagonally separate, but alternate.
(*c*) Joined side by side.
(*d*) Joined alternately.

Group III. consists of patterns formed by combining vertical, horizontal, and true slanting lines, as shown.



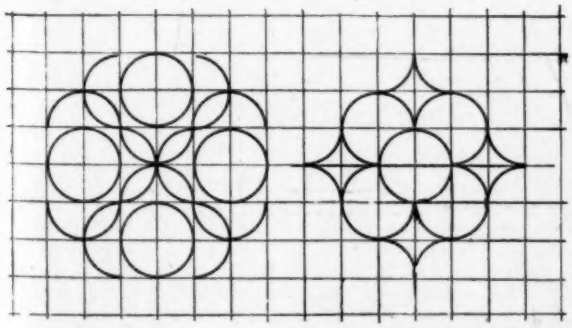
After Group I. slates are used less frequently, paper and millboards being taken in sequence.

SECOND STAGE.

Suitable for children six years old.

Group IV.—The half-slanting line (*a*) alone, (*b*) combined with the previous groups.

Group V.—Curves, circles, and half-circles, with patterns based on these, followed by patterns based upon any simple curve.

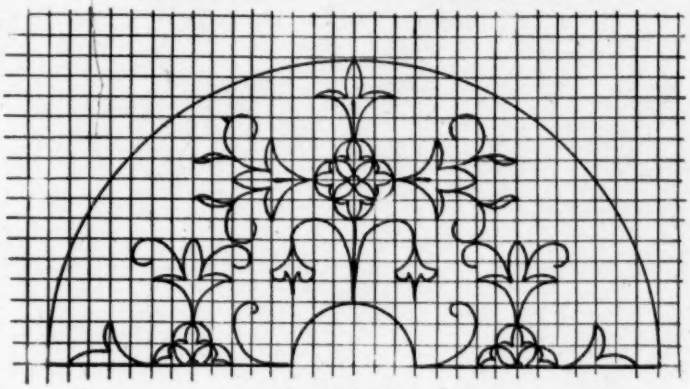


After four to six months' work, the half-inch squares give place to one-inch squares; also plain paper is now used for known copies. At this stage the children are in a position to utilise the whole of their previous knowledge, and are encouraged to reconstruct new patterns by various adaptations of the old. First a centre is taken, then upper and lower parts, followed by right and left portions. In this way the children soon learn to produce some very pretty effects; and when this is once achieved, the progress made with original designs is remarkable. With the inclusion of curves, all kinds of simple objects may now be taken for millboard drawing.

THIRD STAGE.

Suitable for children seven years old. Original designs for flat surfaces.

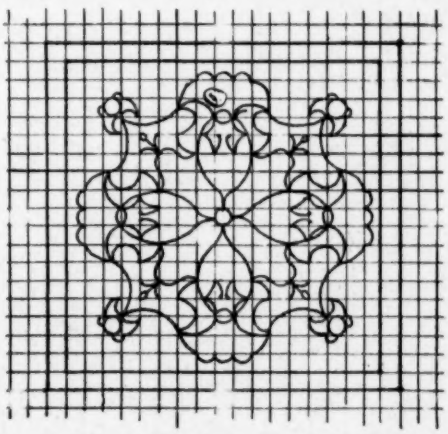
Curve of double flexure to be practised in every possible position, and also combined with simple curves. By referring to pictures of animals and plants, children should be led to see what a very useful line this is, and should be encouraged to introduce it into their own original drawings.



ORIGINAL DESIGN FOR A FAN.

In teaching design, always draw with the class, building up the new forms day after day in the same way, so that children may learn to form clear notions of how to work out their own ideas. To form a central design for a tile or floorcloth, start from a given point, adding a known and simple piece of detail at upper, lower, right, and left extremities. In increasing size, take the corners next—namely, diagonally. Avoid straggling, small, or mean-looking detail, a bold and definite design being far more satisfactory than a mass of mere detail.

Border patterns of various widths may be next attempted, those perfectly square being far easier than the rectangular shapes. In these cases, work from the corners, as these must match from the centre of the work. The border centres



ORIGINAL DESIGN FOR CEILING CENTRE.

TIME-TABLE—HASELRIGGE ROAD SCHOOL, CLAPHAM, S.W.

MORNING.

Day.	Class.	9 to 9.15.	9.15 to 9.40.	9.40 to 10.	10 to 10.30.	10.30 to 10.40.	10.40 to 11.20.	11.20 to 11.55.	11.55 to 12.
MONDAY.	Stand. II.	ASSEMBLY AND PRAYERS.	Scrip. Repetition.	MARKING AND CLOSING REGISTERS AND DRILL.	Arithmetic.	RECREATION.	Object Lesson.	Singing in Hall.	DRESSING, GRACE, AND DISMISSAL.
	Stand. II.		,,		,,		,,	,,	
	Stand. I.		,,		,,		Reading.	Object Lesson.	
	Stand. I.		,,		,,		,,	,,	
	Class I.		,,		,,		Object Lesson.	Reading.	
	Class II.		,,		,,		,,	,,	
	Class III.		,,		,,		Reading.	Object Lesson.	
	Class IV.		,,		,,		,,	,,	
TUESDAY.	Stand. II.		Hymn Sing. in Hall.		Arithmetic.		Geography or Grammar.	Writing.	
	Stand. II.		,,		Drill & Tables.		Arithmetic.	Geography or Grammar.	
	Stand. I.		Scripture Lesson.		Arithmetic.		Dicta. Test by Head-Teacher.	,,	
	Stand. I.		,,		,,		Reading.	,,	
	Class I.		,,		,,		,,	Writing.	
	Class II.		,,		,,		,,	,,	
	Class III.		,,		,,		,,	,,	
	Class IV.		,,		,,		,,	,,	
WEDNESDAY.	Stand. II.		Scripture Lesson.		Arithmetic.		Sol-fa Practice.	Writing.	
	Stand. II.		,,		,,		Writing.	Sol-fa Practice.	
	Stand. I.		,,		,,		Sol-fa Practice.	Prepare Dictation.	
	Stand. I.		,,		,,		Dicta. Test by Head-Teacher.	Sol-fa Practice.	
	Class I.		Hymn Sing. in Hall.		Drill & Tables.		Sol-fa Practice.	Writing.	
	Class II.		,,		,,		Writing.	Sol-fa Practice.	
	Class III.		Scripture Lesson.		,,		Sol-fa Practice.	Writing.	
	Class IV.		,,		,,		Writing.	Sol-fa Practice.	
THURSDAY.	Stand. II.		Scripture Lesson.		Arithmetic.		Prepare Dictation.	Object Lesson.	
	Stand. II.		,,		,,		,,	,,	
	Stand. I.		,,		,,		Object Lesson.	Singing in Hall.	
	Stand. I.		,,		,,		,,	,,	
	Class I.		,,		,,		Reading.	Object Lesson.	
	Class II.		,,		,,		,,	,,	
	Class III.		Hymn Sing. in Hall.		Drill & Tables.		Object Lesson.	Reading.	
	Class IV.		,,		,,		,,	,,	
FRIDAY.	Stand. II.		Scripture Lesson.		Arithmetic.		Reading.	Dicta. Test by Head-Teacher.	
	Stand. II.		,,		,,		Dicta. Test by Head-Teacher.	Reading.	
	Stand. I.		Hymn Sing. in Hall.		Drill & Tables.		Prepare Dictation.	,,	
	Stand. I.		,,		,,		,,	,,	
	Class I.		Scripture Lesson.		,,		,,	Singing in Hall.	
	Class II.		,,		,,		Reading.	,,	
	Class III.		,,		,,		,,	Writing.	
	Class IV.		,,		,,		,,	,,	

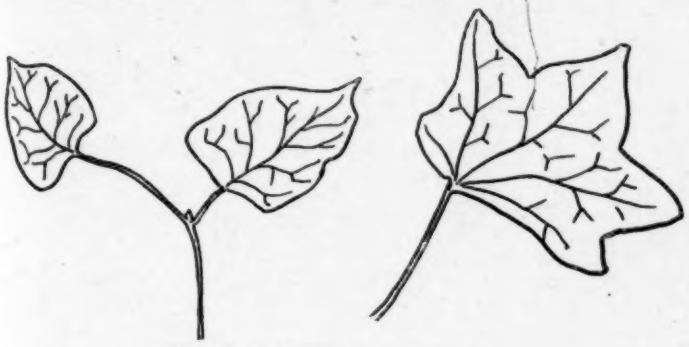
AFTERNOON.

Day.	Class.	2 to 2.15.	2.15 to 3.	3 to 3.20.	3.20 to 3.50.	3.50 to 4.20.	4.20 to 4.30.
MONDAY.	Stand. II.	MARKING AND CLOSING REGISTERS.	Writing and Preparing Dicta.	RECREATION.	Drill.	Reading.	DRESS, PRAYERS, AND DISMISSAL.
	Stand. II.		,,		Reading.	,,	
	Stand. I.		,,		,,	,,	
	Stand. I.		,,		,,	Drawing and Colour.	
	Class I.		Dicta. Test by Head-Teacher.		,,	Writing.	
	Class II.		Writing and Spelling.		,,	,,	
	Class III.		,,		,,	Recitation.	
	Class IV.		,,		,,	,,	
TUESDAY.	Stand. II.		Girls— Needlework. Boys— Drawing and Colour.		Reading.	Recitation.	
	Stand. II.				,,	,,	
	Stand. I.				,,	,,	
	Stand. I.				Drill.	,,	
	Class I.		Girls— Needlework. Boys— Drawing and Pricking.		Reading.	K. G. Occupations.	
	Class II.				,,	,,	
	Class III.				,,	,,	
	Class IV.				,,	,,	
WEDNESDAY.	Stand. II.		Girls— Needlework. Boys— Drawing and Colour.		Reading.	Prepare Dictation.	
	Stand. II.				,,	,,	
	Stand. I.				,,	,,	
	Stand. I.				,,	,,	
	Class I.		Girls— Needlework. Boys— Drawing and Pricking.		,,	K.G. Occupations.	
	Class II.				,,	,,	
	Class III.				,,	,,	
	Class IV.				,,	,,	
THURSDAY.	Stand. II.		Girls— Needlework. Boys— Drawing and Colour.		Singing in Hall, and children play own pieces on piano.		
	Stand. II.				Reading.	Writing.	
	Stand. I.				,,	,,	
	Stand. I.				Writing.	K. G. Occupations.	
	Class I.		Girls— Needlework. Boys— Drawing and Pricking.		,,	,,	
	Class II.				,,	,,	
	Class III.				,,	,,	
	Class IV.				,,	,,	
FRIDAY.	Stand. II.		Writing and Preparing Dicta.		Reading.	Drawing and Colour.	
	Stand. II.		,,		,,	,,	
	Stand. I.		,,		,,	,,	
	Stand. I.		,,		,,	Recitation.	
	Class I.		Writing and Word Building.		,,	,,	
	Class II.		,,		,,	Singing in Hall.	
	Class III.		,,		,,	,,	
	Class IV.		,,		,,	,,	

should be similar on all four sides, and the necessary filling-in between centre and corner of a character suitable to both. A great variety of objects may be brought before children as subjects to work upon, such as tiles, wall papers, book-covers, plates, cushion covers, fans, metal boxes, panels, and so on.

The flat designs may now be coloured in two contrasting colours, or two shades of one colour, in a separate colouring lesson, the millboards being used with advantage for this purpose.

Nature Drawing.—Nothing can equal the teaching derived from leaf and flower forms if the child is rightly directed. At first attempts leaves are placed on a piece of white paper as background, and scholars draw outline. This is also done by teacher on larger scale on blackboard, with added details



NATURE DRAWING (SEVEN-YEAR-OLD).

of stems, etc. Children then repeat on millboards, and after a few lessons taken in this way no difficulty is experienced with the simpler forms met with. The illustrations show what is possible from children seven years old in the way of original work.

FOURTH STAGE.

Suitable for eight-year-old children.

It is in this stage that the early labour is rewarded, and a possibility exists of safely judging of the merits of the scheme.

The chief points in this stage are:—

Nature Drawing.—Leaves, flowers, and fruits are now taken and sketched by the children. During the next lesson these are worked into conventional designs for various purposes, while the third lesson is occupied in colouring the design formed, with water colours.

The millboard drawing of leaves and flowers, animals, or other forms may now be transferred to brown paper.

Ruler and scale drawing is also taken, and this may be made more interesting by filling in the spaces with original freehand designs and colouring.

Needless to say, the more enthusiastic a teacher is the better the result will be. A slight knowledge of botany will prevent many errors in the nature sketching; and lastly, the teacher need not touch a scholar's work to help him if only he be shown how to help himself.

It is in the hope that others may be induced to give the scheme a trial that so much detail has been given. Of course, many steps have necessarily been omitted, but at any time information may be obtained on application to the editor of this journal.

As the time for the termination of this visit approached, the impression was forced upon one that here was a school deservedly enjoying an excellent reputation, due not to any specially favourable circumstances or conditions non-existent in other schools, but depending solely on the solid character of the work done and the intelligence and honesty of those responsible for it.

A RAINY DAY.

Before Matilda was awake
The rain began to pour,
And when the hour for school arrived
It still was raining more;
And, what was worse, the wind as well
Began to sigh and roar.

Mamma looked out of doors awhile,
And shook her head in doubt;
"I fear it is too wild," she said,
"For children to be out.
Listen! the rain upon the roof
Is like a water-spout!

"Love, stay at home with me to-day;
I think it would be wise."
Two shining silver tears arose
In sweet Matilda's eyes,
And though she tried to smile, she heaved
The tiniest of sighs.

She did *so* want to go to school,
And thought it quite a treat
To walk through muddy puddles
With galoshes on her feet,
Hearing on the umbrella top
The patter of the sleet.

But since mamma said, "No, my child,"
She'd better not complain;
She thought the sky was crying too
In heavy tears of rain;
She watched them from the window-seat
Go rolling down the pane.

She saw the hens beneath a shed,
All huddled up together,
With damp and misery and cold
In every quill and feather;
They seemed to say, "Oh, deary me,
What very dismal weather!"

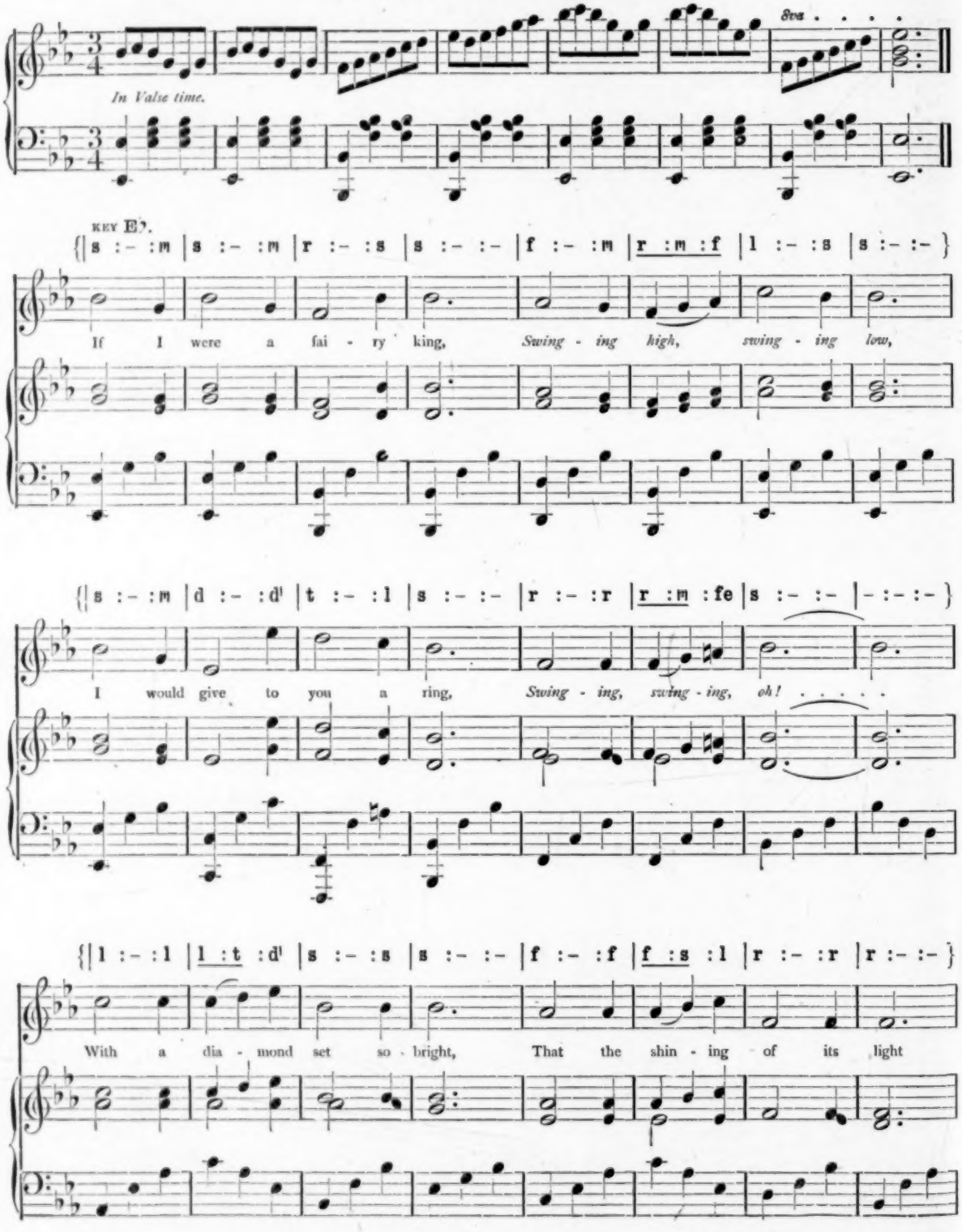
Poor pussy, by the kitchen hearth,
In quite the warmest place,
Sat blinking at the fire, and said,—
"This coat is a *disgrace!*
And as it is a rainy day,
I think I'll wash my face."

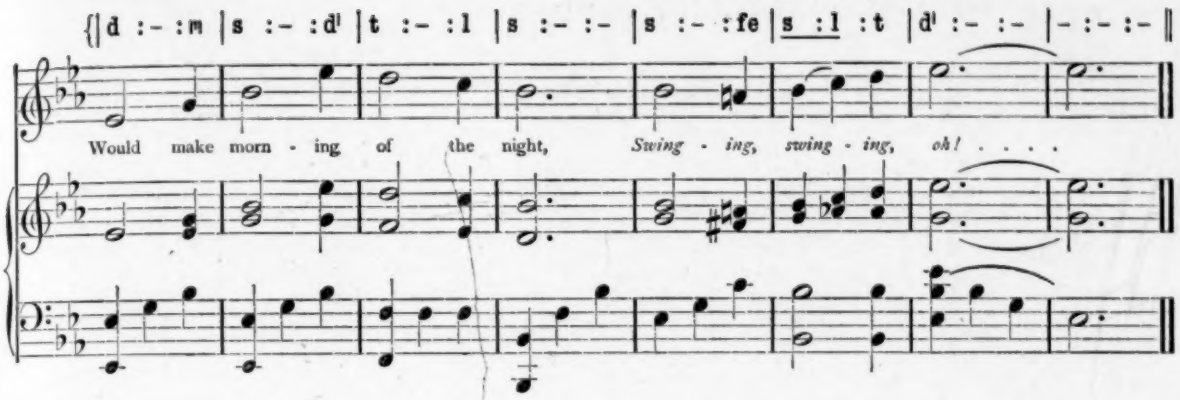
And while he licked his paws,
He at Matilda took a peep,
As if to say, "If *I* were you,
I should no longer weep.
Come sit by me, and warm yourself;
Perhaps you'll fall asleep!"

So sweet Matilda dried her eyes,
And left the window drear,
While pussy nearly bent in two
To wash behind his ear;
Then jumped upon Matilda's lap,
And purred "You are a *dear!*"

MARIE BAYNE.

The principal of the Municipal Technical School, Lancaster, sends us particulars of a scheme for securing regular and punctual attendance and good behaviour and work from the elementary school boys who attend the institute for manual training lessons. With a view to promoting this desirable object, a challenge shield has been offered for competition among the contributory schools. Marks are awarded on three points: (1) regular and punctual attendance; (2) work done at each attendance; (3) results of an annual examination—while a deduction of marks may be made for misconduct. As the award is made on the average mark per head of the boys from each school, any unfairness that might arise owing to different numbers of boys coming from different schools is obviated.

SWINGING AND SINGING.

8va . . . .
In Valse time.
KEY E♭.
{| s :- :m | s :- :m | r :- :s | s :- :- | f :- :m | r :m :f | l :- :s | s :- :- }
If I were a fai - ry king, Swing - ing high, swing - ing low,
{| s :- :m | d :- :d' | t :- :l | s :- :- | r :- :r | r :m :fe | s :- :- | - :- :- }
I would give to you a ring, Swing - ing, swing - ing, oh! . . . . .
{| l :- :l | l :t :d' | s :- :s | s :- :- | f :- :f | f :s :l | r :- :r | r :- :- }
With a dia - mond set so - bright, That the shin - ing of its light



1 IF I were a fairy king,
Swinging high, swinging low,
I would give to you a ring,
Swinging, swinging, oh!
With a diamond set so bright,
That the shining of its light
Would make morning of the night,
Swinging, swinging, oh!

2 On each ringlet as it fell,
Swinging high, swinging low,
I would tie a golden bell,
Swinging, swinging, oh!
And the golden bell would chime
With a merry little rhyme,
In the happy summer-time,
Swinging, swinging, oh!

3 You should wear a satin gown,
Swinging high, swinging low,
All with ribbons falling down,
Swinging, swinging, oh!
And your darling little feet,
O my pretty and my sweet,
Would be shod with silver neat,
Swinging, swinging, oh!

4 But I'm not a fairy, pet,
Swinging high, swinging low,
Nor am I a king as yet,
Swinging, swinging, oh!
So the most that I can do
Is to swing you in the blue,
And to make a queen of you,
Swinging, swinging, oh!

A real swing may be used by a girl and boy while this song is sung by the whole, or there may be appropriate actions given while the song is used in the ordinary way.

A VISIT TO A FRENCH INFANT SCHOOL.

HAVING obtained permission from Monsieur l'Inspecteur d'Académie, I set out with a friend one lovely spring morning to visit an infant school in a neighbouring town.

Arrived at the school, we were graciously received by Madame la Directrice, and taken almost immediately into the playground. Here about one hundred children, between the ages of two and eight years, were running and jumping and shouting and playing with all the enthusiasm of childhood, while the assistant teachers were joining in the games in various parts of the playground. The facility and ease with which the teachers brought themselves down to the level of the children could not fail to strike the observer, however hastily his observations may have been made. For the time being they were children among children, yet with a reserve of practical wisdom and experience which secured for all happiness and justice.

At half-past eight, however, the ranks were formed, and the long line of little toddlers, at a sign from madame, began to sing lustily a patriotic song while marching into school.

The school, like most of the French *écoles maternelles*, consists of two large rooms, with seats all round the walls, and low tables or desks at one end. The rest of the room is used for marching and recreation, no furniture of any kind being placed there. The walls are gaily decorated with pictures and drawings in crayon, as well as many rules for *la morale*.

The children are divided into two sections, according to age and ability. The youngest receive very little "instruction," properly speaking. They are taught to speak, to be polite and kind, and to form good habits generally. The one aim of the teacher of this class is to make the children happy.

The morning of our visit they continued their marching and singing for a short time, and then followed other games similar to our ring games. A certain amount of freedom was allowed: some of the girls took possession of the dolls; some boys began to work a steam-engine. All were happily engaged. Next followed a story told by one of the teachers, and illustrated on the blackboard. The children were encouraged to talk. The interest in the story secured all the discipline necessary. Then the children sang a song, entering into the actions with great vigour. A romp followed, and we left the little ones to pass into the other classroom, where their companions were being initiated into the more serious occupations of life.

Here we found an arithmetic lesson just started. Each child was provided with a bag of pebbles, and was trying to fathom the mystery of subtraction. This was followed by a lesson in reading, when the letters are taught by their sounds: for instance "gn" is taught as a sound, just as "i" would be. No idea is given that there are two letters. "Lle" is taught in the same way. The teacher in France has less difficulty in teaching reading than has her companion in England, because the language lends itself more readily to the phonetic method.

After this lesson the children all marched into the playground, and we had time to look at the time-table, etc. We found that "Froebel's gifts" were as useful to the French as to the English teacher, and many and varied were the specimens of paper folding and mat-weaving worked by the children. In a recess in the room were some strange-looking articles, which when examined proved to be folding hammock beds, which, we were told, are exceedingly useful, particularly in summer. There is still plenty of space in the centre of the room, even when the beds are placed all round the wall.

Every school must, according to the Code, be provided with these hammocks; and it is really necessary, whensone considers that the children pass the whole day at the school.

After the playtime the children were given blocks with which to build, and also sticks for stick-laying. Then a short piece of recitation was taught; and after another song the morning had passed away.

The majority of the children stay at school during the midday recess, and in most schools dinner is provided. It was a very interesting sight to see about eighty tiny children sitting down to dinner at a long, low table. Some elder sisters aged five were feeding their young brothers and sisters of two or three years of age; and some, scorning the help offered to them, struggled manfully to manipulate the unwieldy spoon.

The work connected with this part of school life does not fall upon the teacher; she has only to see that no child is neglected. The Code demands that there shall be in each infant school a *femme de service*—that is, a respectable woman chosen by the *directrice*, who undertakes to look after the physical comfort of the little ones. She it is who washes them when necessary, before school begins; she attends to them if they are sick, and also cooks their dinner.

The idea in giving this dinner is, that having had one good meal every day, the children will be spared any real suffering, in case of neglect: a meal before coming to school, and a meal before retiring at night, is all they require.

After dinner the children again go into the playground until the afternoon school commences. Here they are watched over by the *femme de service*, while the *directrice* and her assistants have dinner.

The *directrice* is free to choose her own subjects in the infant school. She is not restricted as is the *directrice* of a girls' school.

The physical development of the child is the chief aim of the teacher; all real instruction is subordinate. During the summer, from this particular school and many others, the *directrice* and her assistants take the children every Tuesday and Thursday either on the sands or into the fields, and there the children spend the whole day, from 8.30 in the morning until 7 o'clock in the evening, in the open air, perfectly free to amuse themselves as they please, simply overlooked by the teachers to see that no harm is done, or that the little toddlers do not stray too far.

The effect upon the child, both physically and morally, of thus spending two days each week in the fresh air under happy circumstances, can scarcely be over-estimated. It certainly demands much from the teachers, but the result must far outweigh the effort, to the really enthusiastic teacher.

The afternoon class begins at 1.30; and as it was very warm on the day of our visit, the younger children did not enter the schoolroom at all. They remained in the playground, listening to stories, singing their action songs, and marching round the playground; the youngest children, however, peacefully sleeping in their little beds.

The other class went in to their work, and had an object lesson on the "Fowl," given in much the same way as in England. After a little singing, the children took their places in the desks, and had a writing lesson. "Slates" were used which were made of brown paper, covered with some prepared paper to represent slate. These have the advantage of being light, and the writing can be effaced as easily as on the real slates. Recreation followed this lesson; and after two more lessons—singing and recitation, and paper-folding—the school for that day was ended, but not so the work of the teachers.

The parents of the majority of the children are away from home all day, and do not return until towards seven or even eight o'clock. The children are therefore kept at school until they are called for, and this necessitates that they shall again be fed, and still looked after while at play. The children generally bring this meal with them, and so they fetch out their little baskets and sit down contentedly in the playground to eat their "tartine" and drink their cider.

Thus the infant school in France takes the place of the home far more than in England, for the children pass very few of their waking hours in their homes. Even on Sunday they go to school, to be taken to church by the teachers; and on Thursday, the weekly holiday, they go to school to pass their time in play, instead of having their lessons.

Upon leaving the school we felt that there was not one child who went there day by day but who would have a happy childhood to look back upon, and that if the same influences could be continued throughout the early youth of each of them, there ought not to be much fear as to the moral character developed in all.

OUR TUTORIAL SECTION

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Principal of the Belvedere Pupil Teachers' Centre, First on Scholarship List; Author of "Scholarship School Management," "Building of the British Empire," etc.

SCHOLARSHIP EXAMINATION, 1902.

Eighth Month—August.

Work for the Month.

1. *Reading.—The Master of Ballantrae*, chaps. i. to iv. The annotated edition by Messrs. Cassell and Co. should be obtained.

2. *Repetition.*—Ten or twelve lines per week, with plenty of *oral* practice.

3. *Teaching.*—The teaching of geography, chap. ix., *Scholarship School Management.*

The results of geography lessons are frequently very disappointing to young teachers; they feel they have worked their hardest, and have very little to show for their labours. The reason for this is that in very many cases they fail to understand the two great foundation-stones of any successful lesson—what facts should be taught, and *how* they should be taught. Geography to them is a long series of facts to be taught by endless repetition, and with little or no attempt at finding a meaning in the facts or any relation between them. The result is that the children are unmistakably bored and listless, and the time is lost.

Although undoubtedly there are a large number of facts to be committed to memory, an attempt should be made from the earliest lessons to create an interest in every one, and to develop the reasoning faculties of children as well as their memory. The very names of capes and bays, rivers and mountains, countries and towns, often contain a great deal of interest when examined thoroughly. An imaginary journey round a coast or through a district, if properly described, is much better than a bald list of names. Maps must also be used; not the wall-map, with its host of unnecessary names, but a blackboard-map, which is filled up as the lesson proceeds, and which may afterwards be copied by the class.

It is also to be feared that many young teachers fail to give an interesting lesson because they have not taken the trouble to read up the subject-matter and to collect as much interesting and useful information as they will inevitably need. Geography, if taught properly, is the most popular of school subjects.

4. *Drawing.*—A freehand copy per week. The drawing must be of a good size—to fairly fill a half imperial sheet 22 inches by 15. Many specimens sent in are quite useless on account of size, which is often about 6 inches by 4. Great attention must be paid to balance, due proportion, and especially to bold, sweeping curves. The very name of the exercise suggests that freedom and ease of motion without which an exercise looks stiff and wiry. The lining-in must be smooth rather than fine.

5. *Music.*—Chap. viii., *School Music Teacher.* Execution; range of voices; flat singing—its causes and cure; terms commonly used in music.

6. *Penmanship.*—Ten minutes' practice daily in *The Practical Teacher Copy Book.*

7. *Spelling.*—One hundred words per week, from *Words Commonly Misspelt.*

8. *Composition.*—Write one or two essays each week, on such subjects as: "The Proper Use of a Holiday;" "Summer;" "Tragedy and Comedy;" "Ocean Travel;" "Japan and the Japanese;" "The Development of Africa;" write an original story or poem; your idea of happiness.

9. *English.*—

(1.) Twenty-five roots and meanings per week.
(2.) The rules of punctuation.
(3.) The Lake poets.
(4.) *Julius Cæsar*, Act IV., Scene 3, to line 160.

Notes on "Julius Cæsar" (continued).

(1.) *You were best* = it would be best for you to answer truly.

(2.) *You'll bear me a bang. Me* in this case is an instance of the ethical dative, which Shakespeare uses in many passages.

(3.) *These many, then, shall die; their names are pricked.* It was quite usual in Rome, and in fact in most Eastern countries, that when any political faction seized the government, as in this case, their first step was to remove, by execution or assassination, any of the opposite party on whom they could lay hands. Lists were prepared and posted up ("proscriptions"), and those whose names appeared thereon were at once out of the protection of the law. (See Act IV., Scene 3, line 170.) In this case the names were apparently written on a sheet of parchment, and were marked by pricking the parchment with the stylus, a pointed instrument used for writing on wax tablets. The sheriffs of the English counties are still selected in the same manner, by pricking.

(4.) *The threefold world.* The chief divisions of the Roman Empire—Europe, Asia, Africa.

(5.) *Abject orts and imitations.* Antony's estimate of Lepidus is to some extent borne out by history. He lacked the power to originate and to control, and was content to follow: witness his leaving this important meeting to run on an errand. Octavius, from the first, showed a determination and independence equal to that of Antony. *Abject orts* = useless odds and ends thrown aside. The meaning is, when other men have adopted a fashion, have used it and become tired of it and thrown it away, then Lepidus takes it up as something new.

(6.) *We are at the stake.* A reference to bull or bear baiting, where the animal was tied to a post with a length of rope or chain, and dogs loosed to attack it.

(7.) *When love begins to sicken and decay*, etc. This passage is one of those which show Shakespeare's deep insight into human nature. Between firm friends there is no necessity for any of the outward forms and ceremonies of friendship—all that is taken for granted; but when the friendship commences to cool, the consciousness that this is so prompts one or both of the friends to endeavour to make up for the decrease in real feeling by an increase in outward forms. An unreliable man is like many a horse. As the latter, by its prancing, rearing, pulling at the bit when mounted, seems to promise unlimited strength and endurance, which is lamentably absent when the trial of real hard work comes, so the former promises undying affection and assistance in the early days of friendship, only to prove quite untrustworthy when difficulties and dangers approach.

The Lake School of Poetry.

The "Augustan Age," as the writers of the time of Anne termed their era, is distinguished for much that is now considered quite useless. As pointed out in a previous note, the manliness and vigour of the Elizabethan poets was replaced by too great a regard to the *manner* of stating a fact, and too little to what was said. The chief characteristics of the Augustan Age were:—

(1.) A monotony of metre—the iambic pentameter being almost always used. Although a great writer such as Pope could, by continual variations, preserve some melody in this measure, the average poet becomes very monotonous. Of the many writers whom Pope lashed in the *Dunciad*, very few are ever read now, and with good reason.

(2.) The topics discussed were mainly *subjective*—that is, they dealt with man, his duties, thoughts, relationships, etc. "The proper study of mankind is man," says Pope; but modern opinion is that there are many subjects far more attractive and infinitely more profitable. What little *objective* thought there is (that is, thought on nature, things *outside* man) is mainly second-hand; it is what a man has read of, not what he has seen.

As the eighteenth century advanced, the slavish adherence to perfect versification and limited thought somewhat relaxed. Cowper, for example, stands halfway between the Augustan Age and the Lake School. Although he retained the iambic pentameter as the medium of expression, it is not so elaborately polished; and although much of his *Task* deals with man (that is, subjective), nevertheless we find scattered through the poem many inimitable pen pictures of the country and country life (objective), and these descriptions are the results of the writer's own observations.

The Lake School of poets discarded the heroic measure and subjectivity, found inspiration in nature, and expressed their thoughts in whatever metre seemed most convenient. One can

hardly imagine Pope writing such a poem as *Daffodils*. As a result, although the critics in many cases condemned this new style with all their power, the reading public rejoiced. Tired of always considering themselves, they turned with pleasure to the writing of men who could interpret for them the beauties of nature, and show them that in a daisy or a skylark there was ample food for reflection. The simple lyrics of Wordsworth, Coleridge, Southey, Keats, Shelley, Byron, Scott, and Burns are of more value to us, and will live longer in the minds of Anglo-Saxon people, than elaborate treatises on criticism or essays on man.

The nineteenth century witnessed a similar revolt in prose. The novelists of the earlier part produced analytical novels, dealing with problems of character, which were repeated *ad nauseam*. When Rider Haggard produced *King Solomon's Mines*, a romance pure and simple, with no intricate plot and moral dissertations, it was immediately popular, and set the example for a host of young writers—Conan Doyle, Eden Philpott, Anthony Hope, etc.

As reading a note will never cause a student to understand the beauties in poetry, he should study carefully some of the writings of the Lake School. The *Golden Treasury of Songs and Lyrics* will supply him with excellent material.

10. *Geography.*—

(1.) Revise Africa generally (physical features, climate, productions), and the Barbary States, Egypt, Abyssinia, and the Soudan.

(2.) British North America.

In revising Africa, the following points should receive attention:—

(1.) The Dark Continent. Why so called. Inhabited by dark races, and also difficult of access; no great openings, no great navigable rivers, malarial coast, difficulties of transport, tribal wars, Mohammedan fanaticism, etc.

(2.) The discoveries made while trying to solve river problems—for example, the source of the Nile, the course of the Niger, the course of the Zambesi, the course of the Congo, etc. Something should be known of the chief explorers.

(3.) The tropical continent, and the effect of this on climate and productions.

(4.) The races of Africa.

(5.) Morocco. Area, 314,000 square miles, in three well-defined districts—(*a*) the Tell, the fertile regions of the mountains and coast (76,000); (*b*) the steppe land of the mountains (26,000); and (*c*) the Sahara (217,000), with a population of from seven to eight millions.

Exports. Almonds, maize, beans, peas, oils, wood, dates, carpets, leather, gums, and esparto.

Imports. Manufactured hardware goods and textile fabrics.

Towns. Fez, Morocco, Mequinez, Tetuan, Tangier, Rabat, Mazagan, Mogador.

Government. An absolute monarchy, but the sultan has but little authority over the Arab chiefs of the interior.

(6.) *Algeria* is a French dependency, divided into three departments—Algiers, Oran, Constantine—forming an integral part of France with representatives in the Chamber of Deputies.

Exports wheat, wine, esparto grass (used in the manufacture of paper), olive oil, fruit, vegetables, and tobacco. Valuable mineral deposits have been discovered. The French have turned much of the desert into fertile lands by the sinking of artesian wells.

Towns. Algiers, Oran, Constantine, Bona, Bougie.

(7.) *Tunis* is a French protectorate. By a treaty in 1882, the French undertook to occupy and administer the country till "the French and Tunisian authorities recognise by common accord that the local government is capable of maintaining order." This is equivalent to taking his wooden legs away from a crippled man and telling him that he shall have them back when he can walk. The productions are similar to those of Algeria.

(8.) *Tripoli* is a vilayet or province of the Ottoman Empire, with a nomadic population. The only productions are tropical fruits, etc. A large caravan trade with the Soudan is carried on.

(9.) *Egypt* requires special attention because of the British occupation. To understand this a little historical retrospect is necessary.

Mehemet Ali, in 1833, practically made himself independent of Turkey, and till his mind gave way, in 1848, ruled the country well, and extended his power to the great lakes. Under his descendants Abbas (1848–54), Said (1854–63), and Ismail (1863–79), the country went steadily to ruin. The expenditure exceeded the revenue, justice was practically unknown, and all the evils of a corrupt administration flourished. In 1879 Ismail was forced to abdicate, and Mohammed Tewfik succeeded him. A dual control—British and French—was initiated. The two countries had special interest in Egyptian affairs, because of the Suez Canal, which was opened in 1869. The cost was largely borne by English and French capitalists, and in 1875 the British Government bought the Khedive's shares for £4,000,000.

The dual control lasted till 1882, when the revolt of Arabi Pasha occurred. The French having left the whole burden and cost of reducing this insurrection to England, the dual control was abolished, and the finances placed under the care of a British adviser, Major Evelyn Baring (now Lord Cromer). The revolt of the Mahdi in 1883, and his conquest of the southern part of the country, prevented the withdrawal of English troops, and from 1883 to 1898, when the Khalifa (the Mahdi's successor) was defeated at Omdurman, General Kitchener, as he then was, was hard at work making an army and rolling back the Khalifa's followers. At the same time Lord Cromer was working as hard at the finances, with the very satisfactory result that at the present day the country is in a state of prosperity never before known. The agricultural labourer knows that he must pay his taxes, but that when he has once paid he is free from further demands. If he worked hard in former days, he was merely benefiting the tax-collector. The population has increased by 50 per cent. since 1882—a sufficient evidence of the value of settled rule. England has occupied no country without improving it, and this is strikingly true in the case of Egypt.

The railway to Khartoum, the great barrage of the Nile, and other works of a similar nature, make for an increased prosperity; and in spite of the cost of these works, and of keeping up a large army, the revenue exceeds the expenditure by a million and a half.

Imports. Cotton and woollen goods, coals and provisions, hardware, timber, and machinery.

Exports. Cotton and cotton seed (85 per cent. of the whole), beans, wheat, sugar, maize, rice, barley, cigarettes, ivory, and ostrich feathers. Fifty-three per cent. of the whole trade is carried on with the United Kingdom.

The government is peculiar. Nominally it is a province of the Ottoman Empire; really it is self-governing under the Khedive (an annual tribute of £682,092 being paid to the Sultan); practically it is administered by England by means of advisers.

(10.) *The Soudan Provinces.*—The country between Wady Halfa and the great lakes was made into a separate government in 1899, after the suppression of the Dervishes, and already much has been done towards settlement and prosperity. Khartoum is the capital. The Gordon Memorial College, initiated by Lord Kitchener, is making steady progress. The country is divided into six first-class provinces (Dongola, Berber, Khartoum, Sennar, Kassala, Kordofan) and three second-class provinces (Wady Halfa, Suakim, and Fashoda). The Nile has been cleared of the *sudd* blocks (masses of vegetation matted together), and steamer communication with Uganda and the Congo Free State opened. There is no other nation on earth which could have done what England has done—reduced this territory to order, imposed laws, "built the bridge and driven the road," and commenced the enlightenment of one of the darkest parts of dark Africa.

(11.) *British North America.*—Full notes were given under the Pupil Teachers' Course. Students would do well to obtain the excellent little handbook on Canada published by the Dominion Government, and read it carefully. Most of the provinces also issue illustrated guides, etc., which may be obtained from the London agents.

The following are some of the questions asked in various examinations:—

1. Name the chief physical features, industries, and exports of Manitoba and British Columbia.
2. With what objects may emigrants go to Canada? At what ports may they land, and to what parts of the country may they go for different occupations?
3. Describe the river basin of the St. Lawrence.
4. Describe a journey across Canada by the Canadian Pacific Railway.
5. Name the provinces which form the Dominion of Canada, and give the principal towns and chief industries of each.
6. What effects have its mountain ranges upon the climate of British Columbia?
7. Describe the climate of Canada, and explain the names Montreal, Nova Scotia, Newfoundland, Hudson Bay.
8. Say what you can of the following:—Anticosti, Halifax, Hudson Bay, Mackenzie, Ottawa (City), Vancouver City.
9. Describe the animals, plants, and native inhabitants of Canada.
10. "The Dominion of Canada contains all kinds of climate, all sorts of productions, every variety of mineral wealth." Comment on this statement.
11. Describe as fully as you can the industrial pursuits of British North America.
12. Describe as accurately as you can the situation and natural surroundings of the following towns:—Vancouver City, Calgary, Regina, Winnipeg, Quebec, St. John's (Newfoundland).
13. Give some account of the growth of the Dominion of Canada.

14. In the opening up of British North America its physical geography has been a great help—how?
15. Give some account of the nature of the trade between the British Isles and Canada, the time taken to get from London to Montreal, and the cost of letters and telegrams.
16. Give a full description of any one industry carried on in Canada.
17. What do you know of the mineral resources of Canada?
18. What is meant by the Pine Barrens, the Great Lone Land, western ranches, franklin, tobogganing, the Banks, French Canadians?
19. Say what you can of Newfoundland and its government.
20. Describe in detail the district between Lakes Huron, Erie, and Ontario.

11. *History.*—Charles the Second to Anne.

A good text-book will supply all the chief points of this period. The following points may be noticed:—

(1.) The character of Charles the Second's rule. He did not openly claim divine right, but professed to act by his ministers. These were his own nominees, and were thrown on one side when no longer useful: for example, Clarendon was overthrown when the popular demand was for the Triple Alliance; the Cabal ministers were sacrificed to appease the national indignation as the outcome of the Dutch War; Danby was made to bear all the odium of the Secret Treaty of Dover, etc.

(2.) The Clarendon code of laws against the Dissenters was an act of revenge of the Royalist party against the Puritans.

(3.) The Habeas Corpus Act put an end to arbitrary imprisonment. The general principle was as old as the Magna Charta, but this Act inflicted severe penalties for non-observance. The Act has been suspended on many occasions for political reasons. The Government may know that a certain man is the leader of a series of plots, and yet may be unable to prove his connection with them if brought to trial. In such a case the man might be arrested, and the Habeas Corpus Act suspended to allow him to be retained in prison without trial until his plots had fallen to pieces.

(4.) Causes of the Revolution:—The tyranny of the king. His attempts to restore Roman Catholicism. The savage treatment of the rebels by Judge Jeffreys. The suspending and dispensing with laws. The maintenance of a standing army. The Declaration of Indulgence and trial of the bishops. The birth of a son. The nation bore with James because the next heir was a Protestant; but when a son was born who would be educated in the Stuart ideas, their patience gave way.

(5.) Results of the Revolution. These are of vast importance. For the first time in history the exact position of the king and people was defined, and it was stated in clear terms what the king could do and what he could not. (These terms must be carefully prepared.) The Revolution produced a new era in government—government by Cabinet, appropriation of supplies, National Debt, regular Parliaments, etc.

(6.) The War of the Spanish Succession. The causes must be clearly understood. William the Third had spent his life in endeavouring to check the power of Louis the Fourteenth, and had to some extent succeeded. During Anne's reign the struggle was renewed. Charles the Second of Spain ruled over Spain, Belgium, half Italy, and the Indies. He was old, and had no son. The nearest heir was the grandson of his sister, Maria Theresa, wife of Louis the Fourteenth. If he succeeded, France and Spain would be under one king, and the united power would be able to dictate terms to all Europe. In the next line of succession was the Archduke Charles of Austria, and in the next Joseph Ferdinand of Bavaria. By the first Partition Treaty it was arranged that Joseph Ferdinand should succeed, but he died before Charles. By the second treaty the Archduke Charles was to succeed; but on the death of the Spanish monarch Louis broke the treaty, and accepted the crown for his grandson Philip.

During the long war which followed this, Louis the Fourteenth was badly beaten. The archduke had become Emperor of Germany, and to unite Spain and Germany would have been almost as bad as to unite France and Spain, so that peace was made at Utrecht.

(7.) The Union with Scotland and its results is very important.

12. *Arithmetic.*—Measurement of areas and solids.

The chief sources of difficulty in these sums are (1) the confusion of denomination, (2) not drawing a diagram. In the former, remember areas are expressed in square measure. Square measure multiplied by another dimension gives cubic measure. Cubic measure divided by one dimension gives square measure, or divided by square measure gives lineal measure. In the majority of problems a diagram is most important, especially in those dealing with a path round a rectangle.

13. *Algebra.*—The theory of indices.

14. *Euclid.*—Revise Props. 27–34, Book I., with six deductions per week.

15. *Elementary Science.*—In Section II., students have a choice of (*a*) Elementary Chemistry, (*b*) Elementary Astronomy, (*c*) Elementary Biology. Unless students can attend a class for (*a*) or (*c*), they are advised to take (*b*).

Prepare—measurement of angles by degrees, minutes, etc.; determination of position by altitude and azimuth. Apparent motion of the fixed stars.

16. *General Information.*—The answers to the June questions were fairly well done. The following points deserve note:—

(1.) What is the remainder after dividing ·8314 by 3·17, to four places of decimals? Many students moved the decimal point in divisor and dividend, and did not move it back to get the real remainder. Moving the point two places is equivalent to multiplying both by 100. This has no effect on the quotient, but it makes any remainder 100 times too large.

(2.) Several students had never heard of the Railway Clearing House. This is an institution to share properly all amounts paid for passenger or goods traffic over more than one company's lines.

(3.) The questions on the moon were only fairly answered.

(*a*) To see a star "within the nether tip" is impossible; the whole circle of the moon is there, although only a part is visible.

(*b*) As the full moon is opposite the sun, it could not *rise* at midnight; it must rise as the sun sets.

(*c*) The moon has little or no effect on the weather, notwithstanding the popular impression to the opposite effect. Careful observations at Greenwich and elsewhere fail to find any connection between the two. The changes in the moon are frequent, and changes in weather are also frequent, so that the two often coincide, and this coincidence is mistaken for cause and effect.

(*d*) A total eclipse of the moon can only take place at full moon. If there was a new moon on 7th October, there could be no eclipse till the 21st.

(4.) The question of ghosts was very summarily dismissed, with very little attempt to explain the second part of the question. That people do see apparitions cannot be doubted, but it is equally true that what they see exists only in their mind, and has no real existence. When we look at anything, an image is thrown on the retina or back of the eye; the optic nerve conveys the impression to the brain, which becomes conscious of it by some temporary or permanent change of the cells. Now this process may work backward. A change may be produced in the brain by over-fatigue, ill-health, etc. The feeling is conveyed down the optic nerve to the retina, the nerves are set in motion, and the person sees what the brain originated. This can to some extent be done at any time. Look steadily at a bright blue cross on a white ground for some minutes, then look at a piece of white paper, and a cross is perfectly visible, though, of course, there is nothing there.

Questions for Competition.

The answers to these questions are marked gratis. They should be sent *direct* to Mr. A. T. Flux, The Bays, Belvedere, Kent, with a stamped addressed envelope for reply. *They must be accompanied by the coupon of the current number.* A prize of One Guinea is offered to the student scoring the highest percentage of marks.

1. In what districts are the following peoples chiefly found?—Cingalese, Czechs, Hovas, Kurds, Magyars, Parsees, Rajputs, Shans, Zulus.
2. Why do you not get an apple for every bloom on a tree?
3. What is the meaning of I.H.S., S.P.Q.R., K.C.B., M.F.H., D.C.L.?
4. What is the difference between direct and indirect taxation?
5. Why are the front wheels of a waggon smaller than the back wheels? Why does a horse wear blinkers? Why does it not hurt the horse to nail a shoe on?
6. Who are the authors of the following books?—*Children of the Ghetto, Heir of Redcliffe, The Compleat Angler, Atalanta in Calydon, Self-Help, Two Years Ago, The Old Red Sandstone, Far from the Madding Crowd, Daniel Deronda.*
7. Which do you consider the three most important battles in English history? State your reasons.
8. What is a sargasso sea, an atoll, an iceberg, an icefloe? Say briefly how each is made.

Test Questions on the Month's Work.

(The answers to these are marked and returned for a nominal fee of one shilling.)

1. *Penmanship.*
   Large Hand—*Extravaganza.*
   Small Hand—*No war or battle's sound*
   Was heard the world around.
2. Write the outlines of a lesson on the conjunction.
3. Write an essay on "Holidays and their Proper Use."
4. Analyse the following, and parse words in italics:—
   "I am *no* orator, *as* Brutus is,
   But, *as* you know me *all*, a plain blunt man
   That *love* my friend; and that they know *full well*
   That gave me public leave *to speak* of him."
5. What do you know of the trade between England and the West African possessions?
6. Say what you can of productions of the East Indies.
7. Give some account of the work of James the First's Parliaments.
8. Write a life of Wentworth, showing his influence on the politics of his time.

9. (*a*) Three per cent. stock bought at 90¾ is held for six months, at the end of which time the interest is paid; it is then sold at the same price at which it was bought. Find the rate per cent. per annum of interest obtained for the money used. (Brokerage ¼.) Ans. 2 $\frac{8}{11}$.

(*b*) I invest a certain sum in the 4 per cents. at 102½, and after receiving a half-year's dividend, I sell out at 105¾, gaining thereby £207, 4s. in all. What sum did I invest? (Brokerage ¼.) Ans. £4,592.

(*c*) A and B invest each the same sum of money in 3 per cent. stock at 91 and 3½ per cent. stock at 97½—A purchasing an equal amount of each stock, B dividing his money equally between the two stocks. Which receives the larger interest? and if their incomes differ by 1s., how much did they invest? Ans. A; £7,917 each.

(*d*) A man invests £2,730 in the 3 per cents. at 90¾, and sells out part of the stock at 93¾, and the rest at 85¼. He lost £10 by the transaction; how much did he sell out at first? He invests the proceeds in 4½ per cents., and increases his income by £16, 13s. 4d.; at what price did he buy the 4½ per cents.? (Brokerage ¼.) Ans. £2,000 stock; 114½.

10. Explain inclination and declination. Where is the dip needle horizontal? where vertical? Where does a needle point due north, due east, due west?

PUPIL TEACHERS' COURSE.

For Candidates' Examination, 1903.

1. *Reading.*—Take plenty of oral practice in this subject, and take care to understand everything that is read.

2. *English.*—Ver. 9–12, Gray's *Elegy in a Country Churchyard.*

Ver. 9. Subject, *hour*; predicate, *awaits*; object, *the boast of heraldry, the pomp of power, and all.....all*; *that* is the object of *gave*.

The meaning of the verse is: "The hour of death will come to all—those that boast of their illustrious descent, those that have great power, those who are beautiful, and those who are rich. No matter how glorious a man's career may be, it leads only to death." The same idea is thus expressed by Shirley:—

> "The glories of our blood and state
> Are shadows, not substantial things;
> There is no armour against fate—
> Death lays his icy hand on kings;
> Sceptre and crown
> Must tumble down,
> And in the dust be equal made
> With the poor crooked scythe and spade."

Ver. 10. "Nor are the great ones of the world to attribute the fault to these poor villagers because their tombs are in the *churchyard* instead of being within the walls of the church, where the mournful tones of the organ roll down the long aisle and are echoed from the beautifully-carved roof."

Raise is subjunctive mood.

Long-drawn aisle. Aisle is from the Latin, *ala*, "a wing," and is, strictly speaking, the side pieces attached to the main body of the building. *Long-drawn*, giving the impression of great length as one looks down it. *Fretted*, ornamented with carved stones (from *fretan*, "to gnaw away").

Ver. 11. "No monument with praises sculptured on it, no figure carved so as to be life-like, can recall life to the body when once it is dead; the praises and flattery of the living fall uselessly on the ashes of the dead."

Can is the principal verb, defective, having for its completion *call the fleeting breath back to its mansion.*

Ver. 12. "Perhaps in this very churchyard, remote and unknown, there may be laid one whose heart was full of sweet and noble thoughts, who might, under different circumstances, have played an important part in the world of politics, or who might have composed the most exquisite and entrancing poetry."

Some. Demonstrative adjective in this case.

Hands. Supply *perhaps are laid.*

That. Relative pronoun, subject of *might have swayed.*

Read: *Or that might have waked the living lyre to ecstasy.*

3. *History.*—Henry the Third, Edward the First, Edward the Second.

Chief Points:—

Henry III. Government by justiciars during minority.
Misrule on attaining age.
Revolt of the Barons.
De Montfort's Parliament.
The latter is very important.

Edward I. Conquest of Wales.
Conquest of Scotland. Prepare a genealogical table showing the rights of the rival claimants.
Legal reforms. These are *very* important.

Edward II. The bad influences of favourites.
The loss of Scotland and the battle of Bannockburn.
Deposition and death.

4. *Geography.*—England: the six northern, eastern, and southern counties in detail. Much of this is mere revision of what has been done before. Draw maps; insert the names of all places to be remembered, and enter in notebook all important facts with regard to them.

5. *Arithmetic.*—Vulgar fractions. Be sure you understand all the *terms* relating to these—for example, numerator, denominator, proper, improper, compound, complex, etc.

6. *Euclid.*—Props. 3–6. In learning the propositions, divide them into—(*a*) general enunciation; (*b*) particular enunciation; (*c*) construction (if any); (*d*) proof; (*e*) conclusion.

7. *Algebra.*—Chaps. iv. and v., Hall and Knight: Subtraction and Multiplication.

8. *Elementary Science.*—Parallelogram of forces. Composition and resolution of forces.

This must be studied very carefully. A force may be represented in direction and amount by a straight line. Any number of forces acting on a point may be replaced by one force which has the same effect, and one force may be replaced by a number of others.

9. *Music.*—The intervals of the major scale.

First Term Examination.

The answers to the examination will be marked and criticised, if desired. They should be sent to Mr. A. T. Flux, The Bays, Belvedere, Kent, with a postal order for two shillings.

Arithmetic.

(1 hour. 100 marks. Answer three questions, including the first if you can.)

1. (*a*) The remainder in a division sum was 137. The factors used were 5, 8, 6. What were the remainders from each line?
(*b*) What is the quickest way of multiplying £99, 18s. 9d. by 16? What is the result?
(*c*) How many prime numbers are there between 200 and 300?

2. In a game of cricket A, B, and C together score 197 runs. B and C together score 90 runs, A and C together 120. Find the number of runs scored by each.

3. A person buys 325 gallons of spirit at 10s. a gallon. How much water must he add that he may gain £10 and retail the mixture at 7s. 6d. a gallon?

4. What is the largest sum of money which will divide both £7, 9s. 6d. and £13, 4s. 6d. exactly?

5. Three clocks all indicate 12 noon. One gains 90 seconds per hour, the second gains 80 seconds per hour, and the third loses 50 seconds per hour. How long will it be before the *large* hands all indicate the same minute?

Grammar.

(1 hour. 80 marks. Answer Question 1 and two others.)

1. Analyse the following:—
> "*Save that* from *yonder* ivy-mantled tower
> The moping owl *does* to the moon complain
> Of *such as, wandering near* her secret bower,
> Molest her ancient solitary reign."

2. Parse the words in italics.

3. Explain the meaning of the suffixes in the following words:—earldom, health, weakness, hillock, maiden, drunkard, gladsome, flutter.

4. Explain—curfew; glimmering landscape; moping owl; incense-breathing morn; stubborn glebe; annals.

5. Give two examples each of adjective sentences, nominative absolute, superlative degree, passive voice.

Geography.

(1 hour. 80 marks. Answer three questions.)

1. Say what you can of the lakes of England.

2. Describe the course of the Severn, *or* Thames, *or* Trent.

3. Draw a sketch-map of the south of England, marking the capes, bays, islands, and river mouths.

4. From whence do we obtain meat, fish, wheat, cotton, butter, timber, and dried fruits?

5. Where and what are the following?—Dartmoor, the Fens, the Downs, the Peak, the Lizard.

History.

(1 hour. 80 marks. Answer three questions.)

1. Explain how Christianity came into England.
2. Describe, with a plan, the battle of Hastings.
3. What do you know of the feudal system?
4. With what events are the following connected?—Ely, Tenchebrai, *White Ship*, Clarendon, Runnymede, Evesham.
5. Write a life of Becket or Stephen Langton.

Composition.

(40 minutes. 40 marks.)

Write an essay on one of the following subjects:—Flowers, Good Manners, *or* Books.

Science.

(30 minutes. 100 marks. Answer two questions.)

1. What do you understand by the general properties of matter?
2. Explain carefully how you would find the specific gravity of a stone by means of a spring balance and bucket of water.
3. How could you find the centre of gravity of a piece of sheet-iron?
4. What are the three laws of gravitation?

First and Second Years.

1. *Reading and Repetition.*—Take regular daily practice in these subjects.

2. *English: First Year.*—Cowper's *Task*, Book V., lines 80–121. Cowper's *Expostulation*, lines 86–122, with twenty roots and meanings per week.

Second Year.—Milton's *Paradise Lost*, Book III., lines 134–197, with twenty roots and meanings per week.

(Students are invited to write in case of any difficulty. Full notes on these subjects have already appeared in these columns.)

As explained last month, we intend to take for special study Palgrave's *Golden Treasury of Songs and Lyrics.*

Work for the Month.—Numbers 19, 28, 35, 40, 62, 64, 71, 72, 73, 74.

(19.) *Thomas Lodge*, one of the most graceful and correct of minor poets, appeared as an author in 1580. After leaving college he led a wandering life; joined Cavendish in his voyage to the Canaries, during which he wrote *Rosalynde*, which Shakespeare used largely in his *As You Like It*. This poem, which should be carefully studied, is a fine example of Elizabethan thought.

Aurora, the goddess of dawn.

(28.) *Sir Thomas Wyatt* (1503–1542), a distinguished courtier of Henry the Eighth, who died while on a mission to France. Although he wrote little, his poems are good. He entertained a passion for Anne Boleyn, to whom this piece is addressed.

(35.) *Carpe diem* = use the present time.

This is the clown's song in *Twelfth Night*, sung at the request of Sir Toby, who, with his boon companion, Sir Andrew Ague-cheek, votes it to be excellent.

(40.) *Sir Philip Sidney*, the perfect knight (1554–1586). Known better as the author of the Countess of Pembroke's *Arcadia*, practically the first prose romance. His poetry is generally condemned as being affected, but the sonnet here given is most poetical and graceful.

Stella, the lady to whom much of Sir Philip's poetry is addressed, was Lady Rich.

(62.) Another of the clown's songs from *Twelfth Night*. The duke remarks about it,—

> "It is old and plain;
> The spinsters and the knitters in the sun,
> And the free maids that weave their thread with bones,
> Do use to chant it: it is silly sooth,
> And dallies with the innocence of love."

(64.) This exquisite dirge is taken from *Cymbeline*. It should be committed to memory.

(71.) Full of poetical and dainty conceits.

(72.) Another good example of Elizabethan songs; from Lyly's *Alexander and Campaspe*.

(73.) *Thomas Heywood*, a dramatist, who had, he tells his readers, an entire hand or a main finger in 220 plays.

(74.) *Edmund Spenser* (1553–1599), the poets' poet. Author of *The Faerie Queene*, *The Shepherd's Calendar*. (See note.)

Prothalamion = a wedding song.

This poem will well repay careful study. It is a dainty tribute to a house that had helped Spenser much, as he admits in the stanzas.

3. *History: First Year.*—Henry the Third and Edward the First.

Second Year.—William the Third and Anne.

Chief points:—Learn lives of De Burgh and Des Roches; note king's misrule; causes of Barons' War and De Montfort's Parliament.

The important point about the latter is the inclusion of representatives of the *towns*. The meeting was composed of barons, prelates, knights of the shire, commoners. The first two classes had always sat in the Magnum Concilium. The knights of the shire were representatives of a class—the smaller barons—who had originally had that right, but had allowed it to lapse. In summoning them De Montfort was only restoring a lapsed privilege, but the inclusion of burgesses was a distinct innovation, and one which produced important results; for when the Parliament divided into two houses, in 1295, the knights of the shire, who had intermarried with the merchants, went with them to form the House of Commons, and this union gave rise to the great middle class, which has always been the mainstay of England. In France there was no such union; hence the division into nobles and people, which was only terminated by the Revolution. This is a point to be carefully thought over.

Edward the First's reign is important on two lines—(1) the attempt to place the whole island under one rule, which brought about the reduction of Wales and Scotland; (2) the legal reforms.

1275. First Statute of Westminster: ensuring freedom of elections, and limiting feudal aids.
1278. *Quo Warranto* writs: inquiring into the rights of ownership of lands.
1279. Statute of Mortmain: forbidding lands to be left to the Church.
1285. Second Statute of Westminster: instituting the law of entail, and thus preventing any one member of a line of landowners from ruining his descendants.
Statute of Winchester: reviving the principle of the fyrd—each man to be ready to fight—and improving the laws with regard to robberies, etc.
Circumspecte Agatis ("Take care what you are about"): limiting the jurisdiction of clerical courts.
1290. *Quia Emptores:* preventing subinfeudation.
1296. Confirmation of the Charters.

As well as making the new laws, the machinery of the laws—that is, the law courts—was improved. The *great council* was not only the law-making body, but also the chief judicial authority; and it can be readily understood that a general collection of ignorant barons formed a poor court of law, especially as they met only three times a year. The judicial power drifted into the hands of the *Curia Regis*, and they soon were overwhelmed with work. Edward divided the law cases amongst different courts:—

(*a*) Court of Exchequer: for cases concerning the revenue.
(*b*) Court of Common Pleas: for cases between subjects.
(*c*) Court of King's Bench: for matters between king and people.

A sufficient staff of judges was appointed to each court. It is for these reasons that Edward is called the English Justinian.

Second Year.—See Notes for Scholarship.

4. *Geography: First Year.*—Spain, Portugal, Italy, and Switzerland.

Second Year.—British North America.

(*See Notes under Scholarship Course.*)

5. *Arithmetic: First Year.*—Partnership and the miscellaneous exercises in chap. xxxiv.

Second Year.—Stocks and Shares.

6. *Euclid: First Year.*—Props. 13–18, with two deductions per week.

Second Year.—Props. 43–48, with four deductions per week.

7. *Algebra: First Year.*—Chaps. vi. and vii., Hall and Knight: Division and Brackets.

Second Year.—Chap. xvii., Resolution into Factors. This is of the very greatest importance, and unless thoroughly well done, the whole of the work in G.C.M., L.C.M., and Fractions will be rendered much more difficult than it should be.

8. *Elementary Science: First Year.*—Propagation of light; reflection.

Second Year.—Properties, etc., of water, carbon dioxide, lime, and silica.

First Term Examination.

Although there will be no further examination till the Scholarship, pupil teachers must satisfy the inspector that they are making satisfactory progress with their work. A good test of this will be the term examination which we shall give.

The answers will be marked and criticised if sent to Mr. A. T.

Flux, The Bays, Belvedere, Kent, together with a postal order for two shillings.

First Year.

Arithmetic.

(1 hour. 100 marks. Answer three questions, including the first if you can.)

1. (*a*) Define (with examples) ratio, inverse ratio, duplicate ratio, proportion.
   (*b*) How many equations can you make from the proportion A : B :: C : D? Prove each by numbers.
   (*c*) What number has the same ratio to 4 as 4 has to 7?
2. Two men undertake to do a piece of work for 1½ guineas. One could do it alone in 7 days, the other in 8 days. With the assistance of a boy they finish it in 3 days. How should the money be divided?
3. A general having lost $\frac{3}{17}$ of his men in battle, and $\frac{1}{13}$ of the remainder by sickness, had 18,414 left. How many had he at first?
4. If the 8d. loaf weighs 48 oz. when wheat is 54s. per quarter, what should be the price of wheat when the 6d. loaf weighs 32½ oz.?
5. A sum of £132, 18s. 4d. was distributed among a certain number of persons. Half of them received £1, 3s. 9d. each, and half £1, 4s. 7d. each. How many were there?

Geography.

(1 hour. 100 marks. Answer four questions.)

1. Point out how the position and configuration of Europe have helped to make it the leading continent in the world.
2. Take any one of the large rivers of Europe, and describe its course. Draw a sketch-map.
3. Write outline notes of a lesson on the industries of Germany.
4. Say what you can of the cities of Belgium.
5. Describe a coasting voyage from Christiania to Hammerfest. Why is North Norway called the "Land of the Midnight Sun"?
6. What do you know of the Landes, Polders, Zuyder Zee, Maelstrom, Saone, Upsala?

History.

(1 hour. 100 marks. Answer four questions.)

1. What events in England prepared the way for the Norman Conquest?
2. State exactly what was the cause of the quarrel between Henry the Second and Becket. How did it eventually end?
3. Say what you can of the so-called "conquest of Ireland."
4. What were the Crusades? What effects had they on Western Europe?
5. Assign events to the following dates: 1120, 1106, 1139, 1164, 1215, 1216, 1265.
6. What were the relations between Scotland and England between 1066 and 1300?

English.

(1 hour. 100 marks. Answer Question 1 and two others.)

1. Analyse one of the following passages, and parse the words in italics:—

   (*a*) "Long *time* Assyria bound them in her chain,
   Till penitence had purged the public stain;
   And Cyrus, with relenting pity *moved*,
   Returned *them happy* to the land they loved."

   (*b*) " *Well* they eye
   The scattered grain, and thievishly *resolved*
   To escape the impending famine, *often scared*
   As oft return—a pert, voracious *kind*."

2. What is the meaning of the prefixes in the following words: *conscious, impending, impervious, sustenance, subsist, reflection, unregarded, hypocrisy?*
3. What kinds of object do you know? Give an example of each.
4. What is comparison of adjectives? What adjectives do not admit of comparison?
5. Write out any one or two stanzas from Elizabethan writers which you know.

Composition.

(40 minutes. 50 marks.)

Write an essay on "The State of England in Cowper's Time," *or*, give in your own words his description of "The Winter Morning."

Science.

(30 minutes. 50 marks. Answer two questions.)

1. Distinguish between heat and temperature. How is each measured?
2. In what ways may heat be propagated?
3. Describe the construction of the ordinary mercurial thermometer.
4. Explain, by means of a diagram, the changes in volume as ice at −20° C. is heated till it passes off as steam.

Second Year.

Arithmetic.

(1 hour. 100 marks. Answer three questions, including the first if you can.)

1. (*a*) Define percentage, compound interest, and discount (bankers' and true).
   (*b*) If the discount on £280 for a certain time and at a certain rate is £30, find the discount on £961 at the same rate for twice the time.
2. £325 deposited on 10th January 1889 amounts to £329, 11s. on June 5th. Find the rate per cent.
3. A milk-dealer buys pure milk at 11½d. per gallon. How much water must he add that he may sell at 5d. a quart, and obtain a gross profit of 100 per cent.?
4. A gives B 290 yards' start in a mile race, and is beaten by 80 yards. If A give B no start, by how many yards will A win?
5. How far may I travel by coach which goes at 8 miles an hour, starting at 10 a.m., in order to return on foot to the starting-place, at the rate of 3½ miles per hour, by 32 minutes past 2 p.m.?

Geography.

(1 hour. 100 marks. Answer three questions.)

1. What circumstances have hindered the exploration of Africa?
2. Say what you can of the lakes of Africa. Illustrate your answer by a sketch-map.
3. Say what you can of Morocco or Egypt.
4. Describe the proposed course of the Cape to Cairo Railway. How much of it is finished? What do you think the effects will be when it is completed?
5. What do you know of the Tell, hinterland, Blantyre, Tchad, Elmina, veldt?

History.

(1 hour. 100 marks. Answer three questions.)

1. Say what you can of the Stuart theories of government.
2. Write short lives of two of the following: Raleigh, Wentworth, Hampden, Bacon.
3. What do you know of Cromwell's foreign policy?
4. Explain—Pride's Purge, National Covenant, Pacification of Berwick, New Model, Levellers.
5. Write notes of a lesson on "The Trial of the Seven Bishops."

English.

(1 hour. 100 marks. Answer Question 1 and two others.)

1. Analyse the following, and parse words in italics:—

   "*Him* God *beholding* from His prospect high,
   Wherein past, present, future He beholds,
   Thus to His only Son, *foreseeing, spake:*
   'Only-begotten Son, seest Thou *what* rage
   Transports our adversary?'"

2. Explain briefly:—*Stygian pool, Orphean lyre, the Muses, blind Mœonides, pure empyrean, in the dun air sublime.*
3. Point out briefly what changes were produced in the English language by the Norman Conquest.
4. Write notes of a first lesson on analysis.
5. Give the etymology of the names of the parts of speech, and the terms used in analysis.

Composition.

(40 minutes. 50 marks.)

Write an essay on *Paradise Lost*, or, "The Civil War, 1642–48."

Science.

(30 minutes. 50 marks. Answer two questions.)

1. How could you prove the composition of water by synthesis and analysis?
2. Describe exactly how you would prepare oxygen, and what experiments you would work to show its properties.
3. What is the difference between a mixture and a compound? Give example of each.
4. What are the properties of mercury? Describe experiments to show each.

CORRESPONDENCE: RULES (as usual).

GENERAL INFORMATION FOR SCHOLARSHIP.

The Telephone.

THE great advantage of the telephone is that the actual words of the sender are reproduced by the receiving instrument, so that it is unnecessary to learn any system of signals.

In its simplest form, the transmitting instrument consists of a block containing the terminals of the wire connecting the two stations, a short distance in front of which is a fine diaphragm or plate, usually of carbon, while the space between is packed with granules of carbon.

When the speaker directs his voice against the diaphragm, the sound-waves he produces cause the plate to vibrate; if, now, by any means, another plate can be made to vibrate in a precisely similar manner elsewhere, that plate will set up another series of waves corresponding to those originally made by the speaker, and so the words will be reproduced.

The problem, then, that Edison had to solve was, how to make the plate in the receiver vibrate in exactly the same way as the plate in the transmitter. In order to do this, an electro-magnet is placed behind the plate in the receiver, and the space in the transmitter between the plate and the block is packed with granules of carbon. As the latter plate vibrates, these granules are alternately compressed and released, the amount of compression varying with the different vibrations of the plate. This affects the current of electricity which passes through these granules; for it is found that if an electric current is sent through a number of plates or pieces of carbon, the strength of that current will vary according to the lightness or looseness with which the carbon is packed, so in this way the strength of the current passing through the wire is made to vary with every vibration of the plate. In the receiver the wire is wound round a magnet, which thus becomes an electro-magnet whose magnetic force varies with the strength of the current. This magnet is placed near enough to attract the plate of this instrument, and the force with which it is attracted is regulated by the vibration of the plate in the transmitter; so in this way the two plates are made to vibrate in an exactly similar manner.

The Phonograph.

Perhaps it would be as well to mention this instrument in passing, as many people have an idea that this is an electrical device, probably from the fact that it was invented by Edison; but this is not so. The phonograph contains a diaphragm like that in the telephone; but as this vibrates, a sharp point at the back scratches an impression on a cylinder of wax which is made to revolve slowly beneath it. The depth of this scratch will of course vary as the plate vibrates, and it is this that constitutes the "record." When the record is reproduced, the plate is made to press very lightly against the cylinder by means of a delicate spring, and a blunt point travels along the scratch in the record. In this way the plate is made to move up and down according to the depth of the scratch, and thus the vibrations, and consequently the sounds, are reproduced.

The X-Rays.

In order to produce the X-rays, or Röntgen rays as they are sometimes called, after their discoverer, it is necessary to have a vacuum tube containing two electrodes, known as the anode and kathode respectively. If an electric current, small in quantity, but of very high pressure, is sent through the tube, the kathode will give off those mysterious rays which are able to penetrate all substances to a greater or less degree. There is a very popular idea that the X-rays enable us to see through an opaque body, but this needs a little qualifying. The rays pass through some substances more readily than others: all metals, for example, impede the rays, and glass, although transparent to light, is almost opaque to the X-rays. This property enables us, not to see what is inside an opaque covering, but to ascertain the position of any foreign substance. Thus, suppose a surgeon wishes to locate a bullet: if the X-rays are passed through the patient, the bullet will impede them and cast, as it were, a shadow. The rays themselves are invisible, but if they fall on a phosphorescent body they cause it to glow with a greenish light. If then the rays, after passing through the patient, are directed against a phosphorescent screen or a photographic plate, the position and outline of the bullet are shown by the shadow which it makes.

Before leaving this subject, let us consider some of the chief inventions and discoveries which have done so much to advance the arts and manufactures, the steam-engine claiming our attention first as the handmaid of every branch of manufacture.

The earliest steam-engine was probably made by the Marquis of Worcester, a distinguished nobleman of the reign of Charles the Second. This remarkable man was one of those individuals who have had the misfortune to live before their time, and in spite of the fact that he expended the whole of his fortune, amounting to over £10,000, in scientific investigations and discoveries, he was regarded by the public as a dreamer or a lunatic. In his *Century of Inventions* he describes an apparatus in which, by means of steam, he raised a column of water to a height of forty feet. To James Watt, however, belongs the honour of first demonstrating the power of steam, and applying that power to mechanics. The pretty story of how Watt obtained his idea of the steam-engine by watching the steam lift the lid of the kettle, like many other pretty stories, will not bear the light of investigation. Watt's attention was drawn to the possibility of utilising steam as a motor power by being set to repair a small model of a Newcomen or atmospheric engine, whose action depended not on the expansion due to evaporation, but on the contraction caused by condensation. A cylinder, fitted with a piston, was filled with steam; this was condensed by the application of cold water to the outside of the cylinder; and a vacuum being thus produced, the piston was forced in by atmospheric pressure. In order to keep the piston air-tight, it was covered with a small quantity of water, which, of course, cooled the cylinder and lessened the effectiveness of the engine. To remedy this defect, Watt conceived the idea of introducing steam, instead of water, on the other side of the piston; and then it was he perceived that this steam could be utilised to move the piston instead of relying on atmospheric pressure. Having discovered this fundamental principle of the steam-engine, Watt was fortunate in meeting Matthew Boulton, an energetic and far-seeing engineer of Birmingham, who greatly assisted him in introducing the steam engine to the public.

The locomotive may be regarded as the crowning triumph of steam. In September 1825, the first railway train made its trial trip on the Stockton and Darlington Railway. This railway was promoted and carried out by Mr. Pease in the face of great opposition, the original intention being merely to lay a railroad on which wagons could be drawn by horses much more easily than on the ordinary road; but Pease was induced to alter his plans by Stephenson, and to give a trial to a locomotive engine similar to one he had already constructed and was using successfully at the Killingworth pits. The Stockton and Darlington Railway was so successful that Stephenson was commissioned to construct a rail from Manchester to Liverpool, for which he undertook to build an engine which would attain a speed of ten miles an hour. This speed was exceeded by Stephenson's "Rocket," which received the prize of £500 which had been offered for the best locomotive. The only other engine that was at all successful in this competition was the "Novelty," constructed by John Ericsson, a Swede, who subsequently revolutionised steam navigation by the invention of the screw propeller. Henry Bell is generally considered to be the father of steam navigation, although Fulton had launched a steamboat on the Hudson several years before Bell's *Comet* made her trial trip upon the Clyde in 1811.

Iron and steel afford an interesting chapter in the history of inventions. When iron ore is smelted, the first product of the blast-furnace is pig or cast iron—that is, iron containing carbon, silicon, and other impurities, which render it hard and brittle. To reduce this cast iron to a malleable state—that is, to convert it into wrought iron—it goes through the process of puddling, when the molten mass is stirred about for several hours, so that every portion of it is in turn brought to the surface, where the oxygen of the atmosphere unites with the impurities, which thus become separated from the iron in the form of cinder, leaving the malleable or wrought iron. This method of producing wrought iron is generally attributed to Henry Cort, but some claim that honour for Peter Onions.

Steel occupies a position intermediate between cast and wrought iron, its special properties being due to the impurities in the iron, and these qualities will vary as the amount and nature of these impurities vary, thus imparting what is known as "temper" to the steel. Steel was at one time obtained either by removing some of the impurities from cast iron by puddling, or by adding them to wrought iron by heating it with charcoal; but neither method was satisfactory, as the quality of the steel produced was variable and uncertain. The production of steel can now be carried on with perfect accuracy by the Bessemer process. In this process, instead of bringing the molten iron into contact with the air by puddling, Bessemer conceived the idea of forcing air through the molten iron, thus burning off all

the carbon, the exact amount of carbon necessary for the production of any particular quality of steel being then reintroduced by adding the proper quantity of fluid carburet of iron.

Perhaps no branch of industry has presented greater scope for the ingenuity of the inventor than that of spinning and weaving. When yarn was spun by hand, it was done with a distaff and spindle, which in time gave place to the spinning-wheel worked by a treadle. In 1764 James Hargreaves invented his "spinning-jenny," in which, by means of a travelling carriage, a large number of spindles were fed at once. In the "water-frame," invented by Richard Arkwright, a Derbyshire barber, the travelling carriage was displaced by drawing-rollers. A few years later, this was improved upon by Samuel Compton, who invented the "mule," so called because it combined the travelling carriage of Hargreaves with the drawing-rollers of Arkwright.

Space will not permit us to speak of Lee, the inventor of the stocking-frame, or of the many others who have introduced various improvements; but we will conclude by mentioning the opposition that was offered to the introduction of machinery. This opposition came to a head at the beginning of the nineteenth century, when organised bands, known as Luddites, attacked the factories and smashed the machinery, on the ground that machinery lessened the demand for labour.

OUR CERTIFICATE COURSE FOR 1903.

BY GEORGE COLLAR, B.A., B.SC.,

Head-Master of the Stockwell Pupil Teachers' School.

TEST QUESTIONS ON LAST MONTH'S WORK.

Theory of Teaching.

1. Show that the power of spelling correctly depends mainly on the child's powers of observation.

2. Errors in spelling can generally be accounted for. How would you account for the following:—Substraction (for subtraction), form (for from), abscence (for absence), decend (for descend)? Show how an inquiry into the cause of spelling errors may assist a teacher of spelling.

English.

1. Explain briefly how English is related to other members of the Indo-European group of languages.

2. What considerations lead us to describe English as essentially the same language as Anglo-Saxon?

English History.

1. Of what benefit was the Feudal System to the vassals?

2. How was justice administered under the Feudal System? Contrast, in this respect, the feudalism of the Continent with the system established in England.

Geography.

1. Give an account of the chief industries carried on in the German empire. How do you account for the development of German trade during the last twenty years?

2. For what are the following places noted:—Jena, Coblenz, Aachen, Krefeld, Cologne, Leipsic, and Meissen?

Arithmetic.

Divide 4762185 by 348 by the Italian method, and give the mental work of the first two steps.

Elementary Science.

1. What is meant by "sublimation"? Give examples of substances which may be sublimed.

2. State exactly what are the differences between solids, liquids, and gases.

3. What is meant by the "boiling-point" of a liquid? Upon what conditions does it depend?

NOTES AND SYLLABUS FOR AUGUST.

English Composition.

Prepare essays on the following subjects:—

1. Patriotism.

2. Vivisection. What may be said for and against its use?

3. "Tongues in trees, books in the running brooks,
Sermons in stones, and good in everything."
SHAKESPEARE, *As You Like It.*

Study the relation between grammar and composition. Nichol's *Primer of Composition, Part II.*, chap. i., deals with this part of the work in a very able manner. It does not follow that a knowledge of grammar will make a man a good writer, but it may at least lead him to avoid many serious faults.

Theory of Teaching.

Study pages 129 to 155 of Collar and Crook's *School Management*. The whole question of the suitability of grammar as a school subject has been much discussed, some writers urging that young children are unable to profit by a course of grammar lessons. Certainly, as the subject is far too often taught, the children would be much better without it, but that is not an argument for removing it from the curriculum, but for reforming the manner of teaching it.

No one should set about teaching grammar without considering the reason why he teaches it. If the object is merely to enable the pupil to answer questions on examination days, the subject is likely to lead to "cram" of the most pernicious description. The first use of grammar we have referred to above; it supplies us with a standard of correctness in speaking and writing; it can further be made to furnish a very valuable mental training; and thirdly, by studying the derivation of words, not only is their correct use ensured, but the vocabulary is systematically enlarged, and thus we gain an ease and readiness in expressing our thoughts as well as a correctness. In order to secure the best mental training from the grammar lessons, the difficulties of the subject must be clearly realised. It is claimed for grammar that it initiates children into the manner of dealing with the abstract. Now this very connection between the abstract and the concrete is at once the blessing and the curse of grammar teaching. It is a blessing, inasmuch as grammar is almost the only elementary school subject that offers scope for dealing with abstractions; and it is a curse, because it leads to pitfalls into which not only do heedless children stray, but their teachers too frequently lead them headlong. If properly taught, grammar, more than any other of the usual subjects, gives children an opportunity to reason, and that both deductively and inductively. But, alas! too frequently children learn so-called grammar as a matter of pure dogma. The reliance that a child places upon his teacher is one of the most beautiful features of child life; but if it is used to make the child accept from his teacher statements which he should have arrived at through his own reasoning, that reliance is being grossly abused.

Another danger that besets the teacher of grammar arises from the practice of selecting exercises and tests from our masterpieces of literature. Too frequently—as in the case of pupil teachers—the syllabus selects a poem which has to be regarded as a storehouse of difficulties in parsing and analysis, the result being that the pupil is filled with disgust for the literature of his country.

English Grammar and Literature.

Having shown that our language is a continuation of the Anglo-Saxon, we will briefly consider the changes it has undergone since our forefathers introduced it into these islands.

1. The alphabet has undergone few modifications.

(*a*) The Anglo-Saxon characters þ and ð are now represented by *th*.

(*b*) *c* and *g* were generally hard.

(*c*) There was no *q*. The sound of *qu* was represented by *cw*, as *cwēn* = *queen*.

(*d*) The values of the vowels more nearly corresponded with those of modern French and German.

(*e*) R was always strongly trilled, as in Scotland.

(*f*) A double consonant was more strongly pronounced than a single one. Nowadays we make no difference between *inn* and *in*.

2. The four case forms of nouns have reduced themselves to two.

3. With the exception of a few words which follow the primitive mode of forming their plural, our nouns form their plural in *s*. This, and the *'s* for the possessive, are the only noun inflections we have, while Anglo-Saxon had quite a complicated system.

4. Anglo-Saxon adjectives were declined, but in modern English the demonstratives *this* and *that* are the only adjectives that are modified, except for comparison.

5. Our pronominal inflections are much simpler.

6. The number of strong verbs was much greater. Our strong verbs are all of Anglo-Saxon origin, but the weak conjugation is the living one, all new verbs being conjugated like *love*.

7. The past participle was generally formed by the prefix *ge-*, which now survives only in such forms as *y-clept* and in *handiwork*—that is, "hand-ge-weorc," something worked by hand.

8. The vocabulary has undergone very considerable changes.

(*a*) Many words have become obsolete.
(*b*) New words have been adopted.
(*c*) The signification of many words has changed.

Prepare in detail *Richard the Third*, Act I., Scenes 1 and 2.

Line 3. *Lour'd*, frowned, also spelt *lowered;* but it is not connected with the adjective *low* or its derivative, the verb *to lower*, to bring low.

Line 5. *Victorious wreaths.* This and other phrases in the introductory speech refer to the victories of Edward the Fourth, particularly to the battle of Tewkesbury, May 4, 1471. This play is a sequel to *Henry the Sixth, Part III.*, and, indeed, when *Richard the Third* is put on the stage, scenes from the end of *Henry the Sixth, Part III.*, are frequently used as an introduction.

Line 6. *Bruisèd arms.* The context shows that *limbs* are not meant. The two words *arms*, though spelt alike, are from totally different sources. The one meaning weapons is derived from the Latin *arma*, while the one meaning the upper limbs is from Anglo-Saxon *earm*.

Line 8. *Delightful measures*, pleasant dances.

Line 9. *Grim-visaged war.* This figure is called metonomy. "War" is used for warriors in general, and in particular for Edward the Fourth.

Line 10. *Barbèd steeds*—lit., bearded steeds. Perhaps referring to the tassel or tuft often hung below the head of a war-horse. Possibly *barbed* should be *barded*—that is, provided with a bard, as the protective covering of a war-horse was called.

Line 11. *Fearful*—lit., full of fear, not in the modern active sense "causing fear."

Line 19. *Dissembling*—lit., hiding the real condition. Richard claims that his body, which was ugly or ill shaped, conceals his true manliness.

Line 27. *Descant*—lit., sing out about.

Line 30. *Villain*, the same word as *villein*, a serf. Hence one whose conduct is unworthy of a free gentleman. It is hardly likely that Richard would proclaim his determination to be a villain. He would more probably look upon his villainy as the means to secure an end.

Line 32. *Inductions*—that is, plots or plans. It is used in this sense by Lord Buckhurst to describe the introduction to the *Mirror for Magistrates*, which is really the plan or arrangement of the series of poems.

Line 33. *Libels*, unfair accusations; insinuating charges. Lat. *libellus*, a little book.

Line 38. *Mewed up*—that is, confined. The Lat. *mutare*, to change, gives the old word *mew*, to moult or change feathers. The cages in which the hawks and falcons were confined when moulting were called "mews;" and as these cages were kept in or near the stables, a set of stables is now known by that name.

Line 71. *There's no man is secure.* We must regard either "there's" or "is" as redundant, unless we consider the relative "who" as being omitted after "man."

Line 78. *Our way*—that is, our best plan.

Line 100. *Were best he do it secretly.* This is a corruption of a somewhat similar early English construction. "He" has taken the place of the dative "him." Hence the real subject is "(to) do it secretly:" "were" is the subjunctive. The sentence then should be, "It would be best for him to do it secretly."

Line 106. *The queen's abjects.* He will not say "king's subjects," for the term implies a certain amount of dignity; so he makes a play on the words, and says "queen's abjects"—that is, castaways belonging to the queen.

Scene 2, line 3. *Obsequiously*, in a manner becoming a mourner at a funeral. The noun *obsequies* (Lat. *ob*, and *sequor*, I follow) is still used in the sense of "funeral."

"A tear to grace his obsequies."—Gray's *Bard.*

The adverb has, however, changed its meaning, and implies "in a manner put on to curry favour."

Line 12. *In these windows*—that is, the wounds. A person in deep sorrow would hardly play upon words like this.

Line 30. *Interred*, buried. (Lat. *in*, and *terra*, the earth.)

Line 32. *Whiles.* This is an adverb formed from the genitive case of the noun *while* = of the time, or during the time.

Line 56. *Congeal'ed mouths.* The blood had clotted round the wounds, but a popular belief held that the wounds of a murdered man would start bleeding afresh in the presence of his murderer.

65. *Quick*—that is, alive; not to be taken for the adverb *quickly*.

Line 68. *You know.* This dialogue illustrates in an admirable manner the differences between *thou* and *you*. At first Gloucester tries to show respect to Anne, and uses *you;* afterwards he tries to show affection, and uses the singular.

"Look how this ring encompasseth *thy* finger,
Even so thy breast encloseth my poor heart."

Anne, on the other hand, uses *thou* at first to show contempt for Richard, but later on, when Richard has gained a sort of mastery over her, she is constrained to use the plural (lines 222, 223).

Line 107. *Holp*, the strong past tense form of "to help."

Line 116. *Timeless deaths*, untimely; not at the appointed time.

Line 139. Notice the ambiguity in the pronouns: the first *he* refers to Richard, the second to Edward.

Line 145. *Mortal*—that is, deadly. The word is now generally used in an objective sense—that is, liable to death. Here it is subjective, causing death.

Line 157. *Rutland.* See the account of the battle of Wakefield in the history book.

Line 249. *Edward's moiety*, the half of Edward.

English History.

Read to the accession of Edward the First.

The ordinary facts of history are given in the text-books, but we would direct the attention of our readers to a few matters, such as literature and the relations between Church and State. English literature received a notable check at the Conquest, and the most remarkable group of writers in the twelfth century consisted of chroniclers who wrote in Latin. In nearly every monastery was a *scriptorium* or writing-room, and the monks spent a part of each day in writing, generally in copying service books for their churches, or in reproducing "lives of saints" and other works that had found their way into the library of the monastery. Sometimes a monk ventured upon something original, and in the twelfth century this was generally of the nature of history. Eadmer, a Benedictine monk of Canterbury, wrote a history of his own time, of which the central figure is Archbishop Anselm. William of Malmesbury was so content with his position as librarian of the abbey of Malmesbury that he refused the offer to be made its abbot. He displayed great ability as a chronicler, and was warmly supported by Robert, Earl of Gloucester, who figures as the champion of Queen Matilda.

In the ages that followed the disruption of the empire of Charlemagne very little attention was paid to matters educational by European nations, while the Moors of Spain were pre-eminent in this direction; but in the reign of Henry the First a certain impulse was given to science by Athelard of Bath, who, having studied at Tours and Laon, proceeded to travel and acquire knowledge among the Arabs. This led to his writing a book on *Questions in Nature*. In one of his works, called *De Eodem et Diverso*, we may discover the introduction of allegory into our literature, but our readers will perhaps be more interested to learn that Athelard was the first to bring Euclid's *Elements of Geometry* into this country. In 1147 Geoffrey of Monmouth completed his *History of the British Kings*. This he claimed to have based on a book in the British language, which Walter, Archdeacon of Oxford, brought out of Brittany. This book was very remarkable, for it is the source from which numerous legends have been drawn: (*a*) the descent of the Britons from Brut, great-grandson of Æneas; (*b*) the story of Gorboduc, which was made the subject of our earliest English tragedy in 1561, by Sackville and Norton; (*c*) many fictions serving to explain the names of places, as Severn, from Sabrina,

"Virgin daughter of Locrine" (Milton's *Comus*);

(*d*) the story of King Lear and his daughters; and, more particularly, (*e*) the legend of King Arthur.

The story of King Arthur was soon amplified and expanded, and a Christian spirit breathed into it by Walter Map, who associated with it the romances of the Holy Graal, of Merlin, of Lancelot of the Lake. The quest of the Holy Graal and the death of Arthur were also written by Walter Map, but not till a few years later.

From this period date some of our earliest *miracle plays*, a form of drama adopted by the clergy for the instruction of the people.

Layamon, a priest of Worcestershire, was anxious to give a translation of the Chronicle of Geoffrey of Monmouth for

English readers, so he wrote a poem of some thirty thousand lines of alliterative verses, and called it *Brut*.

We referred a short time ago to the great rise in power of the Church under the direction of Hildebrand. The same policy was continued, and we find in England Archbishop Anselm opposing strongly the claim of Henry the First to appoint to Church dignities, and as this was a matter that was agitating the whole of Europe at that time, we must consider the various aspects of the question. A bishop was generally chosen by some small body, such as the brethren of a monastery in the see, but some confirmation of this choice was universally regarded as necessary. As bishops were allowed to vote in the chief state council and had the control of ample domains, which made them the possessors of great temporal power, kings and emperors claimed that the right to confirm a bishop-elect rested with them. On the other hand, as the Popes gained power they protested against the claim of any layman to confer a holy office, and required that the confirmation of the appointment of all the chief ministers of the Church should be in their hands. This conflict is referred to in books on English history as though it affected only the relations of Henry the First and his clergy, but really it was most keen between the Emperor and the Pope, as being respectively the head of the temporal and the spiritual power. The settlement was made in 1122 between Pope Calixtus the Second and the Emperor Henry the Fifth, son-in-law of Henry the First of England. This was really a triumph for the temporal power, for although the sovereign gave up the right to invest with the sacred emblems of the ring and pastoral staff, the Pope was obliged to allow the sovereign the right to exact homage before the ecclesiastic could take possession of the temporalities; and thus he could always refuse to accept homage from an obnoxious person elected bishop, and so debar him from the enjoyment of what was commonly considered the most desirable part of the bishopric.

The next conflict between Church and State was in the reign of Henry the Second, when Becket resisted the king's claim that the clergy should be amenable to the ordinary laws of the realm. At the same time a struggle was going on between the Emperor Frederick Barbarossa and Pope Alexander the Third, and as the former had actually set up an anti-Pope, Alexander was very anxious to secure the support of Henry; and thus at the entreaty of the Pope's almoner Becket at first gave way, and stated his willingness to give the pledge that the king desired, without any reservation. Henry was anxious to make his victory complete, and with the help of his chief justiciary, the Baron de Lucy, he drew up the series of propositions known as the "Constitutions of Clarendon." These rules made the king supreme in all Church affairs. In case of a vacancy in a see or abbacy, the revenues were to go to the king until a successor was appointed, and the election of the successor was to be in the king's chapel and with the king's consent. There was to be the right of appeal from the archbishop to the king, but not to the Pope without the king's permission. None of the clergy might leave the kingdom without the king's permission, and no high officer of state could be excommunicated without the king's previous consideration; and lastly, the point which had given rise to all the trouble was settled by declaring that all clergymen accused of crime should be brought before the king's courts, and the king's judges would decide whether he should be remitted to his ecclesiastical superior or be dealt with according to the general law of the land.

When the assembled lords were called upon to swear to observe these Constitutions, the temporal lords all took the oath willingly, but Becket took it only after much entreaty. When the other bishops had sworn, Henry ordered three copies to be made and sealed by all present. Becket, although he had sworn, refused to seal, and the quarrel broke out afresh. Although the Pope absolved Becket from his oath, he gave him very little support, as he himself was hard pressed by the Emperor; and Becket obeyed the king's summons to attend the court at Northampton, but when he saw that Henry was determined to ruin him, he declared that he would be judged by the Pope alone, and fled from the country. After staying in Flanders and at Pontigny, and when an attempt at reconciliation had failed, Becket came to Canterbury, and was murdered in the cathedral, and Henry obtained absolution from the Pope only on agreeing to cancel the Constitutions of Clarendon.

The quarrel between King John and the Pope was rather of a personal character, and not a matter of principles. It served, however, by its results to strengthen the claim of the Pope to be censor and arbiter of all Christian monarchs. Innocent the Third determined not to treat John's promise to be his vassal as a mere empty form. Henry the Third was obliged to do homage, and the Papal legate, Pandulph, pursued such a domineering policy that from 1217 to 1220 the Pope was absolute master of the country. In 1219, however, Archbishop Langton went to Rome, and obtained a promise that there should be no legate in England so long as he remained Archbishop of Canterbury. Another great opponent of papal rapacity was Robert Grossetête, Bishop of Lincoln, one of the most learned men of the reign of Henry the Third. He refused to obey the Pope's orders to induct an Italian boy into a canonry of Lincoln, and boldly, though respectfully, told the Pope that the command was not apostolic and would be sinful to carry out. The letter caused such an outburst of patriotic enthusiasm in England that the Pope felt constrained, much against his own feelings, to restrain his fury and refrain from the excommunication he intended to pass on the bishop.

Geography.

Study in detail Holland and Belgium. The build of these countries is very simple. From the low tablelands in the south-east on the borders of France the land has a long and very gradual slope towards the north-west, down which the slow and winding rivers make their way to the sea.

Holland is rather more than twice the size of Yorkshire, and is mainly formed by *débris* brought down by the rivers from North France and Germany. Both countries contain "polders"—that is, land reclaimed from water (sea, lake, or river), enclosed by dykes, drained, and generally laid out as pasturage. The largest of these is the Haarlemer Meer Polder, which occupies the site of a former lake south-east of Haarlem. This is intersected by a system of drainage canals, into which the water is often pumped by wind-power, and so led to Halfweg, half way between Haarlem and Amsterdam, where powerful steam pumps send it into two canals, which convey it respectively into the North Sea and Zuyder Zee. Dutch engineers are now maturing plans for draining the Zuyder Zee. In Belgium is a large tract of reclaimed marsh or bog land, called the Campine, which produces excellent butter. It should be noticed that no river of importance rises in either country, although they are watered by the lower courses of important streams.

Holland is remarkably deficient in minerals, and even limestone is so scarce that the people scrape together the shells on the seashore and burn them for lime. The chief occupations of the Dutch are agriculture and fishing, both deep-sea and shore fishing. The Dutch trawlers are found all over the North Sea, and once every week a steamer starts from Harlingen to London laden with nothing but periwinkles.

The cutting and polishing of precious stones affords employment to many hands in Amsterdam, who are celebrated for their skill in this work. A kind of gin, called Hollands, is distilled at Schiedam, about four miles from Rotterdam; other spirituous liquors are also produced in considerable quantity.

The commerce of Holland is very great, and it ranks as the fifth commercial country of the world. A great trade is done in home and colonial products, and an extensive though diminishing transit trade done in German manufactured goods.

Belgium has considerable mineral wealth, and is therefore an important mining and manufacturing country. The agriculture of Belgium closely resembles that of Holland, and the great amount of produce got out of the small farms in Belgium is often referred to as a proof of the superiority of small holdings to large. The only two ports of importance are Ostend, which trades with London and does a certain amount of European coasting trade, and Antwerp, which is a very important outlet for European produce, and carries on a large trade with North and South America.

Notice the localities and nature of the chief Belgian industries: rough iron goods, woollen goods, linen, lace, and cotton goods.

Mark on outline map the railways and chief canals, including the ship canal now open to Bruges, and the trade routes to England; regular steamship lines between Ostend and Dover, Ostend and London, and Antwerp and Harwich.

Arithmetic.

Study the theory of factors and the rules for finding the H.C.F. and L.C.M.

Remember that there are two definitions of H.C.F. (or G.C.M.)—one, that it is the highest number contained in each of two or more others a whole number of times; the other, that it is the product of all the common prime factors. The second suggests the method of finding the H.C.F. by inspection when the numbers have been resolved into their prime factors, and also gives us two principles which enable us to shorten the working—namely, by taking out any prime factor which is common and keeping it as part of the H.C.F., and by removing any factor which is not common from any of the numbers in which it may be seen. Such a factor obviously is not a part of the H.C.F.,

since it is not common, but its removal makes the discovery of common factors easier by reducing the number of factors left.

Similarly we can give two definitions of the least common multiple of two numbers. The working definition describes it as the first number multiplied by those factors of the second which are not found in the first; and if there are more than two numbers, we may say that their L.C.M. consists of the first number multiplied by all the factors of each of the other numbers which are not found in any preceding number.

Putting these definitions of H.C.F. and L.C.M. together, we see that the product of the H.C.F. and L.C.M. of two numbers is the same as the product of the two numbers themselves, since each of these products must contain the same factors.

Algebra.

Revise the work thoroughly to the end of division. The student should work examples of the division of quantities involving brackets, without removing the brackets; this is really simple enough when we have the terms arranged in descending or ascending order of some common letter and the quantities in brackets are coefficients.

Example:—

Divide $x^3 + (a+b)x^2 + (a^2+2ab+b^2)x + (a^3+3a^2b+3ab^2+b^3)$ by $x + (a+b)$.

$$x+(a+b)\overline{)x^3+3(a+b)x^2+3(a^2+2ab+b^2)x+(a^3+3a^2b+3ab^2+b^3)}\overline{)x^2+2(a+b)x+(a^2+2ab+b^2)}$$

$$x^3+(a+b)x^2$$

$$2(a+b)x^2+3(a^2+2ab+b^2)x$$
$$2(a+b)x^2+2(a^2+2ab+b^2)x$$

$$(a^2+2ab+b^2)x+(a^3+3a^2b+3ab^2+b^3)$$
$$(a^2+2ab+b^2)x+(a^3+3a^2b+3ab^2+b^3)$$

Euclid.

Revise to the end of Book I., Prop. 32.

Elementary Science.

Rigid, plastic, elastic bodies.—The three adjectives are applied to bodies to denote the property by which they (*a*) resist alteration of form under the influence of pressure, (*b*) undergo alteration of form without a tendency to recover it when acted upon by pressure, and (*c*) recover their form after they have been compelled by force to change it. These terms are all relative: no body is perfectly rigid—even a substance like cast-iron or stone will yield to the action of pressure to a slight extent—but some bodies are much more rigid than others. In a structure the great art consists in so placing the material in relation to the lines along which the forces act that it will undergo as small a change as possible. The plasticity of a body is the property by virtue of which we are able to mould the shape of bodies. This is particularly useful when by reason of a subsequent change the body loses its plasticity. Thus, hot sealing-wax is very plastic, and will readily receive the impression of a seal; but on cooling it ceases to be plastic, and hence the impression remains. Clay is plastic, and can be moulded into the shape of bricks, vessels, etc.; on drying, and still more in baking, the plasticity of the clay is destroyed, and the article made retains its shape. Plaster of Paris is plastic when freshly mixed, but it soon sets and loses its plasticity. A very common mistake is made in dealing with the term elastic. The most elastic body is not the one which will undergo the greatest amount of alteration of form when pressed, but the one that exerts most force in regaining its form. Thus a piece of india-rubber is really less elastic than a piece of ivory, for although we can easily press an india-rubber ball out of shape, it springs back with much less force than does a ball of ivory. We must be careful not to associate the idea of softness with that of elasticity. Hard steel is very elastic.

Liquids, fluid and viscous.—We referred last month to the gradual way in which some solids turn to liquids and their particles gradually lose their cohesion. There is no such thing as a perfectly fluid substance: every liquid presents more or less viscosity. Some, such as tar and treacle, are very viscous; but others, such as water and alcohol, have comparatively little cohesion.

Answers to Correspondents.

Regner.—Many people have given lists of "Hundred best books." We should advise you to get Lord Avebury's list, and to read carefully and thoughtfully such books on that list as you may come across. The complete set was published in library form a short time ago by the proprietors of *The Daily Mail*.

LOGIC FOR L.L.A. AND LONDON MATRICULATION.

BY T. E. MARGERISON, M.A. (LOND.),

Principal of the Tottenham Pupil Teachers' Centre.

LOGIC has of late played an increasingly important part in London University examinations. A few years ago the aspiring undergraduate was not required to make his first acquaintance with the subject until his preparation for the Final B.A., where it formed part of the Mental Science syllabus. It was then transferred to Intermediate Arts. Later still, Logic appeared as a compulsory subject in the regulations for the new degrees in Divinity, being required from all candidates for Intermediate B.D. And now among the important changes in the new Matriculation scheme is the inclusion of Logic in the long list of optional subjects, of which two must be chosen. The syllabus, which is given in some detail, is as follows:—

The Term: classification of terms, denotation and connotation.
Division, Definition, the Predicables.
The Proposition: classification of propositions, reduction of sentences to logical form.
Laws of thought, opposition of propositions, immediate inference.
The Syllogism: moods and figures, the expression of arguments in syllogistic form.
Hypothetical and disjunctive propositions and arguments.
* Inductive reasoning in its various forms.
* Observation and experiment; canons of scientific induction.
* Combination of induction and deduction; hypothesis and explanation.
Fallacies.

From the close relation which it bears to the teacher's work, and from its general practical usefulness, Logic will no doubt be offered by a large number of intending matriculants, while those who wish to specialise later in Mental Science or Economics cannot do better than take the opportunity thus afforded of making an early start with one of their special subjects. We propose in this and the following numbers to give a series of notes on Logic, which will be found useful by candidates for Matriculation, L.L.A., or any similar examination where an elementary knowledge of the subject is required.

Text-Books.—The best book on the subject for London University examinations is Welton's *Manual of Logic*—two volumes (Clive and Co., 15s.). Candidates who look beyond Matriculation will do well to get this work at once, as, although its treatment is sufficiently exhaustive to make it a reliable guide even up to M.A. standard, the outlines of the subject are so indicated as to enable the beginner to obtain an elementary knowledge at first reading without the preparation of unnecessary matter. *Mental Science, Logic and Ethics for Teachers*, by T. Cartwright, B.A., B.Sc. (Nelson and Sons, 2s. 6d.), has an excellent outline of our subject (as also of Psychology and Ethics), which will be found very useful as a preliminary to a fuller study. Other books are Jevons's *Elementary Lessons in Logic* (Macmillan, 3s. 6d.), Minto's *Logic, Inductive and Deductive* (Murray, 4s. 6d.). A more recent publication, which covers the Matriculation syllabus in a simple, lucid manner, well suited to beginners, is *Elementary Logic*, by Dr. Lightfoot (Ralph, Holland, 1s. 6d.).

Definition and Scope of Logic.—Logic has been variously defined as "the Science and Art of Reasoning" (Whately), "the Science of the necessary Laws of Thought" (Thomson), "the Science of Inference" (Mill). More explicit is its definition as "the science of the laws which regulate valid thought." Its subject-matter is Thought, and its aim is to ascertain and formulate those principles which our thinking must obey in order that our conclusions may be correct.

Logic is primarily a science, since, like all sciences, it is a systematised body of knowledge relating to a particular subject-matter. It claims to be more general than any of the sciences, inasmuch as its laws are applicable to thought in whatever branch of knowledge it may be exercised. On this account Logic has been called the Science of Sciences. It may also be regarded as an art, in that it furnishes us with rules which help us to think correctly.

Since thought is expressed in words, Logic, like Grammar, is concerned with language, and the simple sentence, as the simplest

* These three subjects will be treated in a specially elementary manner.

expression of a complete thought, is the starting-point of both sciences. The logician, however, as we shall see, always moulds the sentence into one form, and his analysis is different from that of the grammarian. He considers primarily the thought which the words express, and words are to him important only as the instrument of thought.

The relation of Logic to Psychology, the Science of Mind, also calls for notice. Psychology investigates the modes in which the mind acts, and therefore it includes within its scope the process of thinking. It deals with the history and origin of that which Logic treats as a fact. Psychology considers *how* we think; Logic treats of the laws to which new thoughts when framed must conform.

Deductive and Inductive Logic.—Logic has two main divisions. *Deductive*, *Pure*, or *Formal Logic* deals with the *forms* of thought, with little reference to its material content. Commencing with the analysis of a simple thought, it considers in order (1) Terms, (2) Propositions, (3) Syllogisms. *Inductive*, *Mixed*, or *Applied Logic* relates to the methods by which we arrive at general laws from the examination of particular instances.

Names or Terms.—A logical proposition is the expression of a thought as a simple assertion or denial—for example, "Books are useful," "Mushrooms are not poisonous." Each consists of three parts—a *subject*, a *predicate*, and a *copula* (with or without "not"). The subject and predicate are called *terms*, because they form the *ends* or boundaries of the proposition. A term may consist of one word only (as in the above examples), or of two or more words—for example, "*The richest man in the world* is not *the happiest of his race.*" Words which can by themselves be used as terms are called *categorematic* words; such are nouns (nominative and possessive case), pronouns, adjectives, participles. Other words, like the objective case of nouns and pronouns, adverbs, prepositions, can only be used to form terms in combination with other words, and are known as *syncategorematic* words.

The classification of terms is very important. The chief classes are as follows:—

I. Individual or *Singular:* a term which can be affirmed in the same sense of one thing only—for example, *London*, *John Smith*, *this watch*, *the longest river in England*.

General: a term which can be affirmed in the same sense of each of an indefinite number of things—for example, *horse*.

Collective: a term which cannot be predicated of each individual of a multitude, but only of all taken together—for example, *troop*, *flock*.

II. Concrete: a name of a thing.

Abstract: a name of an attribute considered apart from the thing possessing it—for example, *humanity* is abstract, *man* concrete.

III. Connotative: a term which names an object and implies an attribute or attributes—for example, *dog*, and all general names.

Non-connotative: a term which simply *names* an object or attribute, and has no meaning in itself. All proper names are non-connotative—for example, *London* merely names an object without implying any attributes. It is true that to any one with ordinary knowledge, London suggests the largest city in the world, etc.; but this is otherwise known, and is not implied by the term itself. The distinction will be clearer to the student after the Connotation and the Denotation of terms have been considered.

IV. Positive: a term implying the presence of some attribute or attributes—for example, *metal*.

Negative: a term indicating the absence of an attribute—for example, *non-metal*.

Privative: the name of something which might be expected to have a certain quality but has it not—for example, *blind*, *deaf*.

V. Absolute: a name in the significance of which there is no prominent reference to something else.

Relative: a name in the meaning of which there is such reference—for example, *husband* (wife), *king* (subject), are relative terms; *man*, *fire*, *house*, absolute.

VI. Univocal: a term which has only one and the same meaning whenever employed—for example, *nitrogen*.

Equivocal: a term which has more than one meaning—for example, *school*, *chest*. The different meanings really constitute so many different terms agreeing in form only.

QUESTIONS.

(A short exercise will be set monthly. Students can have their solutions corrected by sending them to the Editor, Logic Course, PRACTICAL TEACHER, and enclosing seven stamps.)

1. What is Logic? Give reasons for studying it.
2. Define the terms Science and Art. Under which head would you place Logic, and why?
3. Discuss the relation of Logic (1) to the special sciences, (2) to Grammar.
4. What kinds of words can stand as the subject of a proposition, and what kinds are excluded?
5. Describe the logical characteristics of the following terms: tree, darkness, aunt, King Edward, virtue, London Bridge, equal.

HOLIDAY NOTES.

IN the July holiday number of THE PRACTICAL TEACHER we drew the attention of our readers to the special facilities offered by the official agency of the Belgian State Railway and Mail Packet Service, and more particularly to their system of issuing *Rundreise* or combined tour tickets at net official prices. A few days ago, we understand, one of these books of travelling coupons was made up in the office at about an hour's notice. The journey was from Dover to Switzerland *viâ* the Rhine, returning from Bâle by the direct route over Strassburg and Luxemburg, allowing the tourist to travel by the Rhine steamers, or by rail on either side of the Rhine; and the total cost of this ticket, second class, including first class between Dover and Ostend and on the Rhine steamers, was £4, 9s. 6d., or 6s. 6d. less than the ordinary ticket from Dover to Bâle and back. One special feature about this combined tour ticket system is that practically any route may be taken, and mixed classes are allowed—that is, the journey may be part first class and part second, or part second class and part third.

While at the office at 53 Gracechurch Street we inquired about the summer excursions, which we had heard were very cheap; but we were astonished to learn that they have two annual excursions to Switzerland and back, the tickets for which are issued at less than single fares—namely, £4, 1s. 1d. first class, £2, 18s. 6d. second class, and £2, 2s. 6d. third class. The first trip is dated for leaving Dover on the 24th, 25th, or 26th July, connecting in Brussels with a fast train for Berne on 27th July; and the second trip is dated for leaving Dover on the 8th, 9th, and 10th August, connecting with a fast train leaving Brussels for Lucerne on the 11th August. On the outward journey, passengers must travel by these special trains; but the homeward journey, with either ticket, may be made from Berne, Lucerne, or Zurich, at the option of the holder, by all trains of corresponding class, and may be broken at various places. In fact, for the homeward journey, the passenger is perfectly independent, on the one condition that he reaches Brussels before midnight on the 11th August for the first trip, or before midnight on the 26th August for the second trip; and then they are allowed to the 14th and 30th August respectively for the return journey between Brussels and Dover, with permission to stop at Ghent, Bruges, and Ostend.

This reminds us that there is a wonderful exhibition of paintings and early Flemish and ancient art at Bruges now—a sight that certainly ought not to be missed by lovers of the antique. What more pleasant than a summer evening trip from Dover to Ostend, leaving Dover at 4 p.m., and arriving at Ostend at about 7 p.m., in plenty of time for dinner, spend the night there, and then have a long day in that wonderful old city of Bruges, so rich in architectural beauty and antique treasures, returning to Dover the next day at either 11 a.m. or 3 p.m. And what about the cost? Well, from Dover to Ostend and back is only 9s. first class (three days' validity), and from Ostend to Bruges and back is only half an hour's journey each way, and costs about 2s. second class.

There are other excursions, too numerous to mention; but a letter addressed to any of the Belgian State Railway offices at 53 Gracechurch Street, E.C., 72 Regent Street, W., or Northumberland House, Dover, will receive immediate attention, and books and pamphlets will be sent free.

OUR QUERY COLUMN.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

L.L.A., H.E.A.—Five ladies, accompanied each by her daughter, purchased cloth at the same shop. Each of the ten bought as many feet of cloth as she paid farthings per foot. Each mother spent 8s. 5¼d. more than her daughter. Mrs. Robinson spent 6s. more than Mrs. Evans, who only spent about a quarter of what Mrs. Jones did, while Mrs. Smith spent most of all. Mrs. Brown bought 21 yards more than did Bessie, one of the girls; while of the other girls Annie bought 16 yards more than Mary, and spent £3, 0s. 8d. more than Emily. The other girl's Christian name was Ada. What was her surname?
(Tutorial Arithmetic.)

The sum paid by each of the ten is obviously a square number of farthings, so that the difference between the payment made by any one of the mothers and that made by her daughter (the payments being expressed in farthings) is equal to the difference of two square numbers. But by the question the difference is the same in each of the five cases, and amounts to 8s. 5¼d., or 405 farthings. Hence we have to find five pairs of numbers the difference of whose squares in each case is 405. Since the difference of the squares of two numbers is equal to the product of their sum and difference, we must find five pairs of factors, each pair giving 405. These are easily seen to be 405×1, 135×3, 81×5, 45×9, and 27×15.

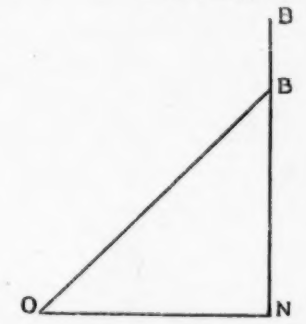
Now the two numbers whose sum is 405 and difference 1 are 203 and 202, the two whose sum is 135 and difference 3 are 69 and 66, the two whose sum is 81 and difference 5 are 43 and 38, the two whose sum is 45 and difference 9 are 27 and 18, and the two whose sum is 27 and difference 15 are 21 and 6.

Hence one of the mothers bought 203 feet at 203 farthings a foot, and her daughter 202 feet at 202 farthings a foot; the second of the mothers bought 69 feet at 69 farthings a foot, and her daughter 66 feet at 66 farthings a foot; the third of the mothers bought 43 feet at 43 farthings a foot, and her daughter 38 feet at 38 farthings a foot; the fourth of the mothers bought 27 feet at 27 farthings a foot, and her daughter 18 feet at 18 farthings a foot; and, lastly, the fifth of the mothers bought 21 feet at 21 farthings a foot, and her daughter 6 feet at 6 farthings a foot.

On examining the foregoing list, we see that the two mothers whose payments differ by 6s., or 288 farthings, are those we have placed fourth and fifth respectively (since $27 \times 27 - 21 \times 21 = 288$). Hence from the data it follows that Mrs. Robinson buys 27 feet and Mrs. Evans 21 feet. Further, since Mrs. Jones spent about four times as much as Mrs. Evans, she must have bought about twice as many feet of cloth. Obviously, then, it is Mrs. Jones who bought 43 feet of cloth. Mrs. Smith, who bought most of all, must have bought 203 feet. There remains Mrs. Brown, who must have bought 69 feet.

Again, since Mrs. Brown bought 63 feet more than Bessie, the latter must have bought 6 feet. Hence Bessie's surname is Evans. Also, since Annie bought 48 feet more than Mary, we see from the above list of purchases that Annie bought 66 feet and Mary 18 feet. Hence Annie's surname is Brown, and that of Mary is Robinson. Again, Annie spent £3, 0s. 8d., or 2912 farthings, more than Emily, and we have seen that Annie spent 66×66 farthings; therefore Emily spent $(66 \times 66 - 2912)$, or 1444 farthings. Hence Emily bought $\sqrt{1444}$, or 38 feet of cloth, so that her surname must be Jones. There remains only Ada, whose surname must be Smith.

J. Calver.—A balloon is moving vertically with the velocity V, and a rifle is aimed so as to hit it, the bullet's initial velocity being $(\sqrt{3} + 1)$V. If the angle of elevation of the balloon from the rifleman be 45°, prove that the angle of elevation of the rifle must be 60°. (Jessop's *Applied Mathematics.*)



Let O be the station of the rifleman, and B the position of the balloon at the instant of firing. Let B_1 be the position of the balloon when hit, and let the time between firing and impact of bullet be represented by t. The height BB_1, through which the balloon rises, is given by Vt; and the *vertical* height NB_1, through which the bullet rises, is given by $(\sqrt{3} + 1)V \sin at$, where a is the angle of elevation of the rifle. Since angle BON is 45°, $\therefore$ NB = ON. And ON is obviously equal to $(\sqrt{3} + 1)V \cos at$, since this expression gives the *horizontal* distance through which the bullet passes in time t.

Hence $NB_1 = NB + BB_1 = (\sqrt{3} + 1)V \cos at + Vt$.

Therefore $(\sqrt{3} + 1) \sin a\, Vt = (\sqrt{3} + 1) \cos a\, Vt + Vt$.

Hence $\sin a - \cos a = \dfrac{1}{\sqrt{3} + 1} = \dfrac{\sqrt{3} - 1}{2}$.

Squaring both sides, we get—

$$1 - \sin 2a = \frac{4 - 2\sqrt{3}}{4} = 1 - \frac{\sqrt{3}}{2}.$$

$$\therefore \sin 2a = \frac{\sqrt{3}}{2}. \quad \therefore 2a = 120° \text{ or } 60°.$$

Hence $a = 60°$ or 30°. The latter value must be rejected, since by the question a must be at least equal to 45°. Therefore $a = 60°$.

Kindly note the rules.

Lanka.—1. A simple method of determining approximately the latitude of any place in the northern hemisphere is the following:—Take a graduated cardboard circle and fix it in a

vertical position in the plane of the meridian. From a pin fixed through the centre hang a small weight by means of a piece of thread. The plumb-line thus formed will give the perpendicular at the given place. A line 90 degrees from this will, of course, be horizontal. The angle between this horizontal and the direction of the pole star will be the latitude of the place. This angle can be easily observed by noticing which radius of the graduated circle points to the pole star, and then reading off the number of degrees between this and the horizontal.

2. When the sun is directly over the equator, its height above the horizon in latitude 51½ degrees will clearly be 90 degrees minus 51½ degrees—that is, 38½ degrees. At midsummer the sun is 23½ degrees north of the equator, and its height above the horizon will therefore be increased by 23½ degrees—that is, the sun will be 38½ + 23½, or 62 degrees, above the horizon. At midwinter the sun is 23½ degrees south of the equator, and it will then be 38½ − 23½, or 15 degrees, above the horizon at midday.

Inquirer.—Suitable books for the course are the following:—*Elementary Physiography* and *Advanced Physiography*, by Thornton (Longmans); and *Elementary Lessons in Astronomy*, by Lockyer (Macmillan). For practical work many useful hints will be found in J. H. Cowham's *Graphic Lessons in Physical and Astronomical Geography* (Simpkin, Marshall, Hamilton, Kent, and Co., Stationers' Hall Court, E.C.).

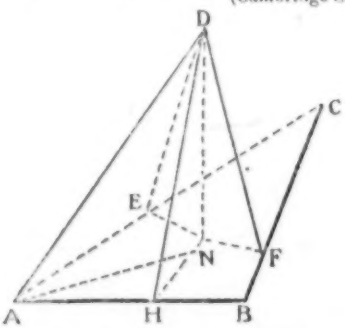
Scamp.—A thermometer is required to have a range of 130°. How much greater must the capacity of the bulb be than that of the stem? The apparent coefficient of expansion of mercury in glass is 0·00015.

As you have not sent the working, we cannot point out the error; but from the data given, the answer given in the book seems to be inaccurate.

Let V denote the volume of the bulb at 0° C. Then volume of stem will be (total volume − V)—

$$\text{Total volume at } 130^\circ = V(1 + \cdot00015 \times 130)$$
$$= V(1 + \cdot0195).$$
$$\frac{\text{Total volume}}{V} = 1\cdot0195.$$
$$\text{Or, } \frac{\text{total volume} - V}{V} = \cdot0195.$$
$$\therefore \frac{\text{volume of bulb}}{\text{volume of stem}} = \frac{1}{\cdot0195} = 51\cdot29.$$

M.C.—If A, B, C, D be four points not in one plane, and planes be drawn through D respectively at right angles to BC, CA, AB, prove that these planes intersect in one straight line.
(Cambridge Senior, 1900.)



Let A, B, C be three points, and D another point not in the same plane with ABC. Join AB, BC, CA, and through D draw the planes DEN, DFN respectively at right angles to AC, CB, and let N denote the point in which DN, their line of intersection, meets the plane ABC.

From N draw NH perpendicular to AB. Join DH, DA, AN. Because AC is at right angles to the plane DEN (constr.), then ACB, being a plane through the line AC, is at right angles to the plane DEN (Euclid, XI. 18). Similarly the plane ABC is at right angles to the plane DFN. Then because each of the planes DEN, DFN is at right angles to the plane ABC, therefore DN, the common section of the first two planes, is at right angles to the third plane, ABC (Euclid, XI. 19).

Because DNA is a right angle, therefore

$$DA^2 = DN^2 + NA^2.$$

But $NA^2 = NH^2 + HA^2$, because NHA is a right angle (constr.).

$$\therefore DA^2 = DN^2 + NH^2 + HA^2.$$

But $DN^2 + NH^2 = DH^2$, because DNH is a right angle.

$$\therefore DA^2 = DH^2 + HA^2.$$

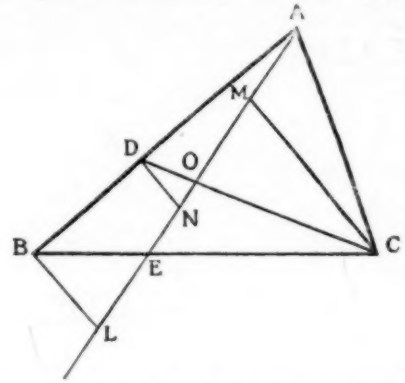
Hence the angle DHA is a right angle.

And AHN is a right angle by construction.

Therefore AB is at right angles to each of the lines HN, HD at their point of intersection H. Hence the plane DHN is at right angles to the line AB.

Therefore the planes DFN, DEN, DHN drawn through D, respectively perpendicular to BC, CA, AB, have been proved to intersect in one straight line. *Q.E.D.*

Crescent.—ABC is a given triangle. A point D is taken in AB such that BD : DA :: 2 : 3, and a point E is taken in BC such that BE : EC :: 1 : 2. Join CD and AE intersecting in O. Find the ratio DO : OC. (S. and A. Mathematics, Stage 3, 1901.)



Through the points B, C, and D draw three straight lines in any common direction (for example, at right angles to AE), meeting AE or AE produced in L, M, and N.

Then DON, COM are similar triangles.

$$\therefore DO : OC :: DN : CM \quad . \quad . \quad . \quad . \quad . \quad (1)$$

Again CME, BLE are similar triangles.

$$\therefore CE : BE :: CM : BL.$$
$$\therefore 2 : 1 :: CM : BL \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Also ABL, ADN are similar triangles.

$$\therefore BA : AD :: BL : DN.$$
$$\therefore 5 : 3 :: BL : DN \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

Compounding the ratios (1), (2), and (3), we have

DO . 2 . 5 : OC . 1 . 3 :: DN . CM . BL : CM . BL . DN.

Hence the ratio 10 DO : 3 OC is equal to unity.

$$\therefore DO : OC :: 3 : 10.$$

Ixion.—A square is rotating round a diagonal. It strikes against an inelastic particle of half the mass at a point on the other diagonal half-way between the centre and angle. Determine the change of motion.

If the particle were elastic, and the point of the body where the collision took place followed Newton's law for elastic bodies, with coefficient of rebound = e, determine the change of motion.

Ans.—(*a*) Angular velocity = $\frac{2}{3}w$.

$$\text{Velocity of particle} = \frac{2a\sqrt{2}}{9}w.$$
$$\text{Velocity of centre of gravity} = \frac{a\sqrt{2}}{9}w.$$

(*b*) Angular velocity = $\frac{2 - e}{3}w$.

$$\text{Velocity of particle} = \frac{\sqrt{2}}{9}(1 + e)aw.$$
$$\text{Velocity of centre of gravity} = \frac{aw(1 + e)}{9\sqrt{2}}.$$

(Hicks's *Dynamics*, Ex. xx., No. 29.)

We have been unable to verify the results given above. The following is the solution of the problem:—

(*a*) *Inelastic particle.* Let a be the length of a side of the square, while m is the mass of the square, and $\frac{m}{2}$ is the mass of the particle. The moment of inertia of the square = $m\frac{a^2}{12}$.

Let w and w_1 be the initial and final angular velocities of the square. Since the inelastic particle, after impact, moves on with the square, its final velocity is equal to $\frac{aw_1}{2\sqrt{2}}$. The moment of the momentum lost by the square during impact is equal to the moment of the momentum gained by the particle, both moments being measured with respect to the axis of rotation. Then, since the moment of momentum of a rotating body, with respect to the axis of rotation, is equal to the moment of inertia, multiplied by the angular velocity, of the body, we have—

$$m\frac{a^2}{12}(w - w_1) = \frac{m}{2} \cdot \left(\frac{a}{2\sqrt{2}}\right)^2 w_1 = \frac{ma^2}{16} w_1.$$

$$\therefore w_1 = \tfrac{4}{7}w.$$

$$\text{Velocity of particle} = \frac{a\sqrt{2}}{7}w.$$

(*b*) *Elastic particle.* The impact of an elastic particle may be divided into two stages. In the first, the velocity of the particle and that of the point of impact on the square become equal. In the second half, the particle recovers its original shape, and in doing so gains in momentum. Let e be the coefficient of rebound. Then, during the first stage of the impact, the velocity of the particle acquires the value $\frac{a\sqrt{2}}{7}w$, and the momentum gained is equal to $\frac{m}{2} \cdot \frac{a\sqrt{2}}{7}w$. During the second stage, the particle acquires e times this amount of momentum, so that its final momentum is equal to

$$\frac{ma}{7\sqrt{2}}(1 + e)w.$$

Let w_1 be the final angular velocity of the square. Then, equating moment of momentum lost by square to moment of momentum gained by particle,

$$m\frac{a^2}{12}(w - w_1) = \frac{ma}{7\sqrt{2}} \times \frac{a}{2\sqrt{2}} \cdot (1 + e)w.$$

$$= \frac{ma^2}{7 \times 4}(1 + e)w.$$

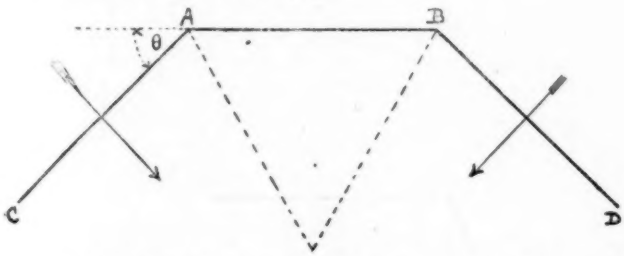
$$\therefore w_1 = \frac{4 - 3e}{7}w.$$

When $e = 0$, this reduces to the result obtained for an inelastic particle, as should be the case.

$$\text{Velocity of particle} = \frac{a\sqrt{2}}{7}(1 + e)w.$$

S. Hadfield.—Three equal inelastic rods of length a, freely hinged together, are placed in a straight line on a smooth horizontal table, and the two outer ends are set in motion about the ends of the middle rod with equal and opposite angular velocity w.

Show that when the ends meet the triangle formed by the three rods will move with a velocity $\frac{1}{4}aw$.



The length of each of the equal rods should be $2a$. You have not stated where your problem is derived from, but the result obviously implies that the length should be $2a$ instead of a.

Let AB be the middle rod, AC and BD the two outer rods. The two rods are set in motion about the ends of the middle rod with equal and opposite angular velocity w: at any instant when the rod AC makes an angle θ with BA produced, the velocity of the centre of gravity of AC is aw perpendicular to AC.

The two components are $x = aw \sin\theta$ horizontally, and $y = aw \cos\theta$ vertically. At the instant when the two ends C and D meet, the horizontal components will balance—or in other words, the sum of the horizontal components is zero; the sum of the vertical components is $aw \cos\theta$; the angle θ in this position is 120°, and $\cos 120° = -\frac{1}{2}$. Hence substituting for θ we have $-\frac{aw}{2}$; the negative sign merely implies that the direction of motion is downwards.

Let m be the mass of each rod, and v the velocity of the whole after impact.

Then $$2m \times \frac{aw}{2} = 3m \times v,$$

$$\text{or } v = \tfrac{1}{3}aw.$$

The result may also be obtained by a simple application of the calculus.

Thus, if x and y are the components of the middle point of AC, then $y = a \sin\theta$.

$$\frac{dy}{dt} = a \cos\theta w$$

$$= -\frac{a}{2}w \text{ when impact occurs.}$$

In like manner $x = a \cos\theta$. $\quad\therefore \frac{dx}{dt} = -a \sin\theta w.$

At the instant when impact occurs the horizontal components vanish, or—

$$\frac{dx}{dt} = 0 \text{ and } \frac{dy}{dt} = \frac{a}{2}w.$$

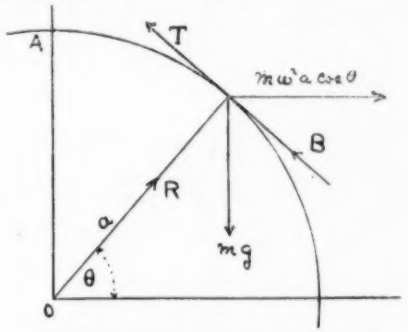
From this the velocity v can be obtained, as in the preceding solution.

You will find some typical solutions on *virtual work* in the "Science Section" during the coming session.

Warrender.—A heavy particle is attached to the highest point of a smooth sphere of radius a by an elastic string whose natural length is $\frac{\pi a}{8}$, and the weight of the particle is sufficient to stretch it to double its natural length: at first the particle moves uniformly in a small circle, the string being stretched to double its natural length. Prove that, if the motion be slightly disturbed, the time of a small oscillation will be

$$2\pi\sqrt{\frac{a}{g}\frac{\pi\sqrt{2}}{(4\sqrt{2} - 5)\pi + 8\sqrt{2}}};$$

and find the greatest blow it can receive along the direction of the string without leaving the sphere.



Let A be the highest point of the sphere (to which the particle P is attached); let m be the mass of the particle.

Resolving forces parallel to T, we have

$$m\frac{d^2x}{dt^2} = T - mg\cos\theta - mw^2a\cos\theta\sin\theta,$$

where x denotes displacement from mean position.

Now, in position of equilibrium,

$$mg = T_0 = \frac{mg}{\sqrt{2}} + mw_0^2\frac{a}{2},$$

$$\text{or } mg = \frac{mg}{\sqrt{2}} + mw_0^2 \times \frac{a}{2}.$$

$$\therefore w_0^2 = \frac{2g}{a}\left(1 - \frac{1}{\sqrt{2}}\right),$$

$$T = mg\left(1 - \frac{8x}{\pi a}\right).$$

Again, from equation of angular momentum about OP,

$$ma^2\cos^2\theta = \frac{w_0a^2}{2},$$

$$\text{or } w^2 = \frac{w_0^2}{4\cos^4\theta}.$$

$$\theta = \frac{\pi}{4} + \frac{x}{a},$$

$$\cos\theta = \frac{1}{\sqrt{2}}\left(1 - \frac{x}{a}\right),$$

$$\sin\theta = \frac{1}{\sqrt{2}}\left(1 + \frac{x}{a}\right).$$

As $\frac{x}{a}$ is a small quantity, its squares may be neglected. Hence

$$\frac{d^2x}{dt^2} = g\left(1 - \frac{8x}{\pi a}\right) - \frac{g}{\sqrt{2}}\left(1 - \frac{x}{a}\right) - g\left(1 - \frac{1}{\sqrt{2}}\right)\frac{\sin\theta\cos\theta}{2\cos^4\theta},$$

$$\frac{d^2x}{dt^2} = g\left\{1 - \frac{8}{\pi a}x - \frac{1}{\sqrt{2}} + \frac{1}{a\sqrt{2}}x - \frac{\left(1 - \frac{1}{\sqrt{2}}\right)}{2}\frac{\frac{1}{\sqrt{2}}\left(1 + \frac{x}{a}\right)}{\frac{1}{2\sqrt{2}}\left(1 - \frac{3x}{a}\right)}\right\},$$

$$\text{or, } \frac{d^2x}{dt^2} = g\left\{1 - \frac{1}{\sqrt{2}} - \left(\frac{8}{\pi} - \frac{1}{\sqrt{2}}\right)\frac{x}{a} - \left(1 - \frac{1}{\sqrt{2}}\right)\left(1 + \frac{4x}{a}\right)\right\}.$$

$$\therefore \frac{d^2x}{dt^2} = \frac{gx}{a}\left\{-\frac{8}{\pi} + \frac{1}{\sqrt{2}} - 4 + \frac{4}{\sqrt{2}}\right\},$$

$$\text{or, } \frac{d^2x}{dt^2} + \frac{g}{a}\frac{(4\sqrt{2} - 5)\pi + 8\sqrt{2}}{\pi\sqrt{2}} = 0.$$

$$\text{Hence periodic time} = 2\pi\sqrt{\frac{a}{g}\frac{\pi\sqrt{2}}{(4\sqrt{2} - 5)\pi + 8\sqrt{2}}}.$$

Let B denote the greatest blow the particle can receive without leaving the sphere. Then equating forces parallel to R—

$$B = mv. \quad \therefore v = \frac{B}{m};$$

or, in position of equilibrium,

$$R = \frac{mg}{\sqrt{2}} - \frac{mw_0^2a}{2} - \frac{mB^2}{m^2a};$$

$$\text{or, } \frac{w_0^2a}{2} = g\left(1 - \frac{1}{\sqrt{2}}\right).$$

To find B, we put

$$R = 0.$$

$$\therefore mg\left(\frac{1}{\sqrt{2}} - 1 + \frac{1}{\sqrt{2}}\right) = \frac{B^2}{ma}.$$

$$\therefore am^2g(\sqrt{2} - 1) = B^2.$$

$$\therefore B = m\sqrt{ga(\sqrt{2} - 1)}.$$

Macrae.—Find the sum of a number of terms in geometrical progression, and show that when the common ratio of a geometrical progression is numerically less than 1, the sum of an infinite number of terms has a finite limit. Give a geometrical illustration of the fact. If $S_1, S_2, S_3, \ldots . Sp$, be the sums to infinity of geometrical series whose first terms are respectively 1, 2, 3 . . . . p, and whose common ratios are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4} \ldots . \frac{1}{p+1}$ respectively, prove that

$$S_1 + S_2 + S_3 + \ldots . + Sp = \frac{p}{2}(p + 3).$$

(M.A. and first B.Sc. Examination, St. Andrews, 1902.)

In any modern work on algebra it is proved that if a denote the first term in a geometrical progression, r the common ratio, and n the number of terms, then S, the sum of the first n terms, is given by the formula $S = \frac{a(r^n - 1)}{r - 1}$; and also if r is less than 1 and n becomes infinitely great, then the value of S is given by the formula—

$$S = \frac{a}{1 - r} \ldots . (2) \ldots .$$

For a geometrical illustration of the latter formula, let a line AB, one inch in length, represent the first term a, and let the common ratio r be one-half. Then the second term is represented by BC, half an inch in length; the third by CD, one-fourth of an inch long, etc.; whence it is plain that the sum of the terms continually approaches the limit—a line two inches in length. For if AB be produced to Z, so that BZ is equal to AB, then if AX represents the sum of any number of terms, the next term is found by taking half the remainder XZ, and this process can be repeated an infinite number of times, until the remainder XZ becomes indefinitely small, and the sum of the terms is then represented by AZ—a line two inches long. If we write 1 for a and $\frac{1}{2}$ for r in the formula $S = \frac{a}{1 - r}$, we have $S = \frac{1}{1 - \frac{1}{2}} = 2$, which result agrees with the geometrical illustration.

From formula (2) we have—

$$S_1 = \frac{1}{1 - \frac{1}{2}} = \frac{1}{\frac{1}{2}} = 2,$$

$$S_2 = \frac{2}{1 - \frac{1}{3}} = \frac{2}{\frac{2}{3}} = 3,$$

$$S_3 = \frac{3}{1 - \frac{1}{4}} = \frac{3}{\frac{3}{4}} = 4,$$

. . . . . .

$$Sp = \frac{p}{1 - \frac{1}{p+1}} = \frac{p}{\frac{p}{p+1}} = p + 1.$$

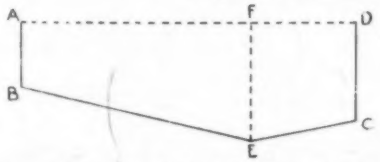
$$\therefore S_1 + S_2 + S_3 + \ldots . Sp = 2 + 3 + 4 + \ldots . + p + 1.$$

Hence $S_1 + S_2 + S_3 + \ldots . Sp$ is equal to the sum of an arithmetical series whose first term is 2, last term $p + 1$, and number of terms p. From the formula for the sum of an arithmetical series we find this amounts to $\{2 + (p + 1)\}\frac{p}{2}$, for the sum of an arithmetical series is equal to the sum of the first and last terms multiplied by half the number of terms.

$$\therefore S_1 + S_2 + S_3 + \ldots . + Sp = \frac{p}{2}(3 + p).$$

M.J.B.—A swimming bath is 90 ft. long and 30 ft. broad, 6 ft. deep at one end, and 3½ ft. deep at the other. The deepest part of the bath is 10 ft. from the deeper end; it is here 6½ ft. deep, and the bottom slopes upward from this part to each end, so as to form two inclined plane surfaces. The bath is filled with water in 2½ hours, through a pipe whose interior cross-section is 18½ sq. in. Find the rate in feet per second at which the water runs through the pipe.

(Diploma Examination, 1901.)



The area of a side of the bath is made up of two trapeziums, ABEF, FECD, of which AD is 3½ ft., EF 6½ ft., CD 6 ft., AF 80 ft., and FD 10 ft. The area of the side is therefore $\frac{1}{2}(3\frac{1}{2} + 6\frac{1}{2}) \times 80 + \frac{1}{2}(6\frac{1}{2} + 6)10 = 400 + 62{\cdot}5 = 462{\cdot}5$ sq. ft. Hence the bath will hold $462{\cdot}5 \times 30 = 13875$ cub. ft. of water.

Let V be the rate in feet per second at which the water runs through the pipe. Then $V \times \frac{18{\cdot}5}{144}$ is the number of cubic feet of water which enters the bath in one second. Therefore $\left(V \times \frac{18{\cdot}5}{144}\right) \times (2{\cdot}5 \times 60 \times 60)$ cub. ft. enter in 2½ hours.

Hence, by the question—

$$V \times \frac{18{\cdot}5}{144} \times 2{\cdot}5 \times 60 \times 60 = 13875.$$

$$\therefore V = \frac{13875 \times 144}{18{\cdot}5 \times 2{\cdot}5 \times 60 \times 60} = \underline{12 \text{ ft. per second.}}$$

J.G.—If $y = \tan^{-1}\frac{\sqrt{1 + x^2} - \sqrt{1 - x^2}}{\sqrt{1 + x^2} + \sqrt{1 - x^2}}$, then $x^2 = \sin 2y$.

Prove that $\frac{\sin 8a}{2\sin a} = \cos a + \cos 3a + \cos 5a + \cos 7a$, and

$\tan^{-1}\left(\frac{x\cos\phi}{1 - x\sin\phi}\right) - \tan^{-1}\left(\frac{x - \sin\phi}{\cos\phi}\right) = \phi.$

(St. Andrews M.A., 1902.)

From the first of the given equations we have—

(i) $$\frac{\tan y}{1} = \frac{\sqrt{1 + x^2} - \sqrt{1 - x^2}}{\sqrt{1 + x^2} + \sqrt{1 - x^2}}.$$

$$\therefore \frac{1 + \tan y}{1 - \tan y} = \frac{\sqrt{1 + x^2}}{\sqrt{1 - x^2}}.$$

$$\therefore \frac{(1+\tan y)^2}{(1-\tan y)^2} = \frac{1+x^2}{1-x^2}.$$

$$\therefore \frac{(1+\tan y)^2-(1-\tan y)^2}{(1+\tan y)^2+(1-\tan y)^2} = \frac{(1+x^2)-(1-x^2)}{(1+x^2)+(1-x^2)} = x^2.$$

$$\therefore \frac{2(2\tan y)}{2(1+\tan^2 y)} = x^2.$$

$$\therefore \frac{2\tan y}{1+\tan^2 y} = x^2.$$

$$\therefore \frac{2\dfrac{\sin y}{\cos y}}{\dfrac{\cos^2 y+\sin^2 y}{\cos^2 y}} = x^2.$$

$$\therefore \frac{2\dfrac{\sin y}{\cos y}}{\dfrac{1}{\cos^2 y}} = x^2.$$

$$\therefore 2\sin y\cos y = x^2.$$

$$\therefore x^2 = \sin 2y.$$

(ii) $\cos\alpha + \cos 7\alpha = 2\cos 4\alpha\cos 3\alpha.$

$\cos 3\alpha + \cos 5\alpha = 2\cos 4\alpha\cos\alpha.$

$$\therefore \cos\alpha+\cos 3\alpha+\cos 5\alpha+\cos 7\alpha = 2\cos 4\alpha(\cos 3\alpha+\cos\alpha) = 2\cos 4\alpha(2\cos 2\alpha\cos\alpha) = 4\cos 4\alpha\cdot\cos 2\alpha\cdot\cos\alpha.$$

$$\frac{\sin 8\alpha}{2\sin\alpha} = \frac{2\sin 4\alpha\cos 4\alpha}{2\sin\alpha} = \frac{\cos 4\alpha\cdot 2\cos 2\alpha\sin 2\alpha}{\sin\alpha}$$

$$= \frac{4\cos 4\alpha\cdot\cos 2\alpha\cdot\cos\alpha\cdot\sin\alpha}{\sin\alpha} = 4\cos 4\alpha\cdot\cos 2\alpha\cdot\cos\alpha.$$

$$\therefore \frac{\sin 8\alpha}{2\sin\alpha} = \cos\alpha+\cos 3\alpha+\cos 5\alpha+\cos 7\alpha.$$

(iii) The postulated relation,

$$\tan^{-1}\frac{x\cos\phi}{1-x\sin\phi} - \tan^{-1}\frac{x-\sin\phi}{\cos\phi} = \phi,$$

is true if $\tan^{-1}\dfrac{x-\sin\phi}{\cos\phi} + \phi = \tan^{-1}\dfrac{x\cos\phi}{1-x\sin\phi}$;

that is, if $\dfrac{\dfrac{x-\sin\phi}{\cos\phi}+\tan\phi}{1-\dfrac{x-\sin\phi}{\cos\phi}\tan\phi} = \dfrac{x\cos\phi}{1-x\sin\phi}$;

that is, if $\dfrac{\dfrac{x-\sin\phi}{\cos\phi}+\dfrac{\sin\phi}{\cos\phi}}{1-\dfrac{x-\sin\phi}{\cos\phi}\cdot\dfrac{\sin\phi}{\cos\phi}} = \dfrac{x\cos\phi}{1-x\sin\phi}$;

that is, if $\dfrac{x\cos\phi-\sin\phi\cos\phi+\sin\phi\cos\phi}{\cos^2\phi-x\sin\phi+\sin^2\phi} = \dfrac{x\cos\phi}{1-x\sin\phi}$;

that is, if $\dfrac{x\cos\phi}{\sin^2\phi+\cos^2\phi-x\sin\phi} = \dfrac{x\cos\phi}{1-x\sin\phi}$.

And this is the case, since $\sin^2\phi+\cos^2\phi = 1$. Hence the postulated relation is true.

Pax.—Two equal rods, AB, BC, are freely jointed at B. BC receives a blow through its centre perpendicular to its length. Determine the initial motion (1) when the rods are in the same line, (2) when ABC is a right angle. Determine in each case the proportion of the energy taken up by each rod.

(Hicks's *Dynamics.*)

1. Let P be the blow, Q the resultant force at the joint B, m the mass of each rod, and $2a$ the length; w_1, w_2 respectively the angular velocities of AB, BC, u the velocity of the centre of AB, v the velocity of the centre of BC.

I, the moment of inertia of each rod about its centre, $= \frac{1}{3}ma^2$.

Then $P - Q = mv$, $Q = mu$.

$$Q\cdot a = Iw_2 = \frac{1}{3}ma^2w_2.$$

$$\text{Also } Qa = Iw_1 = \frac{1}{3}ma^2w_1.$$

$$\therefore w_1 = w_2.$$

$$\text{Again, } v - aw_1 = u + aw_1.$$

$$\therefore v - u = 2aw_1.$$

$$\text{And } v + u = \frac{P}{m}.$$

$$\text{Also } mu = \frac{1}{3}maw_1.$$

Hence $u = \frac{1}{3}aw_1$, $v = \frac{7}{3}aw_1$, and $\dfrac{P}{m} = \dfrac{8}{3}aw_1$.

$$\therefore w_1 = w_2 = \frac{3P}{8ma}.$$

Hence the angular velocity of AB is equal to the angular velocity of BC, and is measured by $\dfrac{3P}{8ma}$; u, the velocity of the centre of AB, $= \dfrac{P}{8m}$; and v, the velocity of the centre of BC, $= \dfrac{7P}{8m}$.

$$\text{Energy of BC} = \frac{1}{2}mv^2 + \frac{1}{2}\cdot\frac{1}{3}ma^2w_2^2$$

$$= \frac{49P^2}{2\times 64m} + \frac{9P^2}{6\times 64m} = \frac{52}{2\times 64}\cdot\frac{P^2}{m}.$$

$$\text{Energy of AB} = \frac{1}{2}mu^2 + \frac{1}{2}\cdot\frac{1}{3}ma^2w_1^2$$

$$= \frac{1}{2}\frac{P^2}{64m} + \frac{9}{6\times 64}\frac{P^2}{m} = \frac{4}{2\times 64}\frac{P^2}{m}.$$

$\therefore$ energy taken up by BC : energy taken up by AB

$$= 52\cdot\frac{P^2}{128m} : 4\cdot\frac{P^2}{128m}$$

$$= \underline{13:1.}$$

2. In this case w_1 is obviously zero. Also we have—

$$v - u = -aw_2,$$

$$v + u = \frac{P}{m}.$$

$$\therefore 2v = -aw_2 + \frac{P}{m}.$$

$$\text{Again, } mv = \frac{1}{3}maw_2.$$

$$\therefore v = \frac{1}{3}aw_2.$$

$$\text{Hence } \frac{2}{3}aw_2 = -aw_2 + \frac{P}{m}.$$

$$\therefore \frac{5}{3}aw_2 = \frac{P}{m}.$$

$$\therefore w_2 = \frac{3P}{5ma}.$$

$$\text{Also, } 2u = \frac{P}{m} + aw_2$$

$$= \frac{P}{m} + \frac{3}{5}\frac{P}{m}.$$

$$\therefore u = \frac{4}{5}\frac{P}{m},$$

$$\text{and } v = \frac{1}{5}\frac{P}{m}.$$

$$\text{Energy of BC} = \frac{1}{2}mu^2 + \frac{1}{2}\cdot\frac{1}{3}ma^2w_2^2$$

$$= \frac{1}{2}m\frac{16}{25}\frac{P^2}{m^2} + \frac{1}{6}ma^2\frac{9P^2}{25a^2m^2}$$

$$= \frac{16}{50}\frac{P^2}{m} + \frac{3}{50}\frac{P^2}{m}$$

$$= 19\cdot\frac{P^2}{50m}.$$

$$\text{Energy of AB} = \frac{1}{2}mv^2$$

$$= \frac{1}{2}m\frac{1}{25}\frac{P^2}{m^2}$$

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$$= \underline{19:1.}$$

Todhunter's *Algebra*, § 213.

Multiplying $ax + by + cz = d$ by $b''c - b'c''$,

$a'x + b'y + c'z = d'$ by $bc'' - b''c$,

$a''x + b''y + c''z = d''$ by $b'c - bc'$,

and adding, we obtain the result—

$$\{a(b''c' - b'c'') + a'(bc'' - b''c) + a''(b'c - bc')\}x$$
$$+ \{b(b''c' - b'c'') + b'(bc'' - b''c) + b''(b'c - bc')\}y$$
$$+ \{c(b''c' - b'c'') + c'(bc'' - b''c) + c''(b'c - bc')\}z$$
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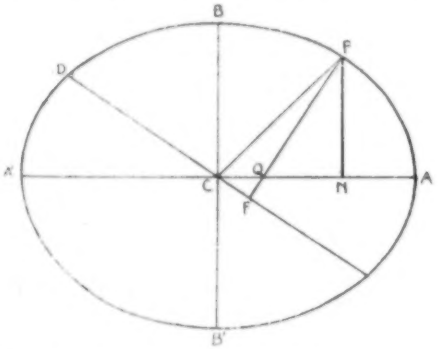

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Let x, y be the co-ordinates of the point P.

Denote the angle PCA by λ, and the angle PQA by λ'.

Then $\tan \lambda = \frac{y}{x}$, $\tan \lambda' = \frac{y}{x(1 - e^2)}$.

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Hence

$$\tan(\lambda' - \lambda) = \frac{\tan \lambda' - \tan \lambda}{1 + \tan \lambda' \tan \lambda}$$

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$$= \frac{(a^2 - a^2 e^2)^{\frac{3}{2}}}{a^2 \sqrt{1 - e^2} (1 - e^2 \sin^2 \lambda')^{\frac{3}{2}}}$$

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The Destruction of St. Pierre.—Dr. Nicholls, C.M.G., of Dominica, writes as follows concerning the hot blast that caused such terrible loss of life at Martinique:—"The eruption came suddenly and unexpectedly, and probably in a few minutes the 35,000 persons in the city of St. Pierre were corpses. It would appear that a sudden fissure was opened on the side of the mountain overlooking the city, and near to the Étang Sec on this flank of the volcano a large vent belched out lava, superheated steam, and acid gases downwards on to St. Pierre and the roadstead. The flashing off into steam of the water imprisoned in the incandescent lava converted that lava into sand and dust before it reached the city, and the radiation of heat from molten rock at a temperature of above 1000° C. caused an incredibly hot blast that would create a red-hot hurricane—if I may employ such a term—that would kill people and animals instantly, and that would cause all inflammable matter to burst into flame. This, from what I gather, is what really happened, and I do not think that poisonous gases or electrical phenomena are accountable for the destruction of life. You can imagine what is the enormous heat right over the vent of an active volcano. Well, St. Pierre practically for a short time was in such a position, the vent being directed laterally towards the city until the fissure was closed and the volcanic ejecta were again directed vertically upwards. Many persons were actually burnt in places by hot scoriæ and mud, but the blast of heat from the volcanic vent appears to me to account in the only satisfactory way for the details I have obtained of the conditions found in the living and the dead."

The Origin of Lightning in Volcanic Eruptions.—As soon as any condensation takes place in the mass of uprushing vapours, small drops of water are formed, these drops exhibiting an electrical charge which may be due to a combination of a large variety of causes or to any one of them separately. In consolidating themselves together into larger drops, these particles, assuming roughly a spherical form, soon exhibit a tremendous increase in their electrical charge, due to the fact that when a number of them aggregate to form a larger spherical drop, the diameter of the latter increases only as the cube root of the total rate of aggregation.

In other words, eight small drops, each having an approximately equal small charge, unite to form another drop of twice the diameter of its constituents, and having, therefore, only twice the electrical capacity, but with four times the charge, and consequently four times the electrical potential. In this way, as the vapours aggregate, the drops forming around any dust particles or similar solid objects that may be present, the mass of condensing vapour increases in electrical potential until enormous voltages are attained and the lightning flash leaps to earth.

In volcanic explosions it is fair to assume from the conditions obtaining that the initial charge—whether this be due to friction or to chemical action and heat combined—may be very high, so

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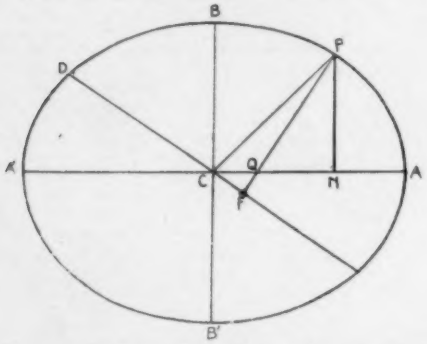

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Foucault's Pendulum.—During a recent visit to the Pantheon in Paris, we noticed a railed-in circular space under the great dome, which was the scene of Foucault's classical experiment which made evident to the sight the fact of the rotation of the earth. Upon inquiry we learned that the workmen are busy making preparations for a new series of demonstrations, to be conducted under the supervision of M. Berger, the able assistant of M. Poincaré. The pendulum to be used in the experiment is a ball of lead weighing twenty-seven kilogrammes, and is the same as was used by M. Maumencée for observations in the cathedral of Rheims for several months. The demonstration will be open to the public, and is likely to become a permanent feature at the Pantheon.

Sunspots, Temperature, and Rainfall.—The result of an investigation by Mr. Maxwell Hall relative to the mean maximum temperature and the rainfall of Jamaica and sunspot frequency has recently been published officially at Jamaica. The temperature observations, a full account of which he gives in the paper, extend over the years 1881 to 1898, and to eliminate minor irregularities Mr. Hall employs for the yearly value the mean of the year and the means of the year on each side of this middle year; thus, to take an example, the value for 1885 is the mean for the three years 1884, 1885, and 1886. The temperature variations found in this manner, when compared with the variation in the spotted area of the sun's surface, bring out a close relationship between these two phenomena. Thus it is observed that the temperature is at a maximum at sunspot minimum, and *vice versâ*, and that this variation amounts to about 2° F. With regard to the variation of rainfall as deduced from a discussion of the yearly means of rainfall, Mr. Maxwell Hall has previously shown that up to the year 1887 there was a general resemblance between the sunspot curve and that of rainfall, the maxima and minima of the rainfall variations corresponding approximately with those of the curve representing the sun's spotted area; but there were certain irregularities which suggested that the old view that there was most rain at the maximum and least at the minimum of the eleven-year curve was only approximately true. The further discussion of the rainfall observations up to the year 1899 shows, however, that this apparent law breaks down completely. When in 1889 and 1890 the rainfall curve should have been at a minimum, in reality it showed a subsidiary maximum, while also when at the sunspot maximum of 1893–4 the rainfall should have been excessive, it was conspicuous by a great deficiency.—*Nature.*

The Destruction of St. Pierre.—Dr. Nicholls, C.M.G., of Dominica, writes as follows concerning the hot blast that caused such terrible loss of life at Martinique:—"The eruption came suddenly and unexpectedly, and probably in a few minutes the 35,000 persons in the city of St. Pierre were corpses. It would appear that a sudden fissure was opened on the side of the mountain overlooking the city, and near to the Étang Sec on this flank of the volcano a large vent belched out lava, superheated steam, and acid gases downwards on to St. Pierre and the roadstead. The flashing off into steam of the water imprisoned in the incandescent lava converted that lava into sand and dust before it reached the city, and the radiation of heat from molten rock at a temperature of above 1000° C. caused an incredibly hot blast that would create a red-hot hurricane—if I may employ such a term—that would kill people and animals instantly, and that would cause all inflammable matter to burst into flame. This, from what I gather, is what really happened, and I do not think that poisonous gases or electrical phenomena are accountable for the destruction of life. You can imagine what is the enormous heat right over the vent of an active volcano. Well, St. Pierre practically for a short time was in such a position, the vent being directed laterally towards the city until the fissure was closed and the volcanic ejecta were again directed vertically upwards. Many persons were actually burnt in places by hot scoriæ and mud, but the blast of heat from the volcanic vent appears to me to account in the only satisfactory way for the details I have obtained of the conditions found in the living and the dead."

The Origin of Lightning in Volcanic Eruptions.—As soon as any condensation takes place in the mass of uprushing vapours, small drops of water are formed, these drops exhibiting an electrical charge which may be due to a combination of a large variety of causes or to any one of them separately. In consolidating themselves together into larger drops, these particles, assuming roughly a spherical form, soon exhibit a tremendous increase in their electrical charge, due to the fact that when a number of them aggregate to form a larger spherical drop, the diameter of the latter increases only as the cube root of the total rate of aggregation.

In other words, eight small drops, each having an approximately equal small charge, unite to form another drop of twice the diameter of its constituents, and having, therefore, only twice the electrical capacity, but with four times the charge, and consequently four times the electrical potential. In this way, as the vapours aggregate, the drops forming around any dust particles or similar solid objects that may be present, the mass of condensing vapour increases in electrical potential until enormous voltages are attained and the lightning flash leaps to earth.

In volcanic explosions it is fair to assume from the conditions obtaining that the initial charge—whether this be due to friction or to chemical action and heat combined—may be very high, so

the intensity and extent of the lightning phenomena exhibited will not be wondered at. The lightning is only one of the forms in which the released potential energy of the imprisoned hot liquids and vapours manifests itself.

CHEMISTRY.

(ADVANCED AND HONOURS.)

BY T CARTWRIGHT, B.A., B.SC.

Solid Carbon Dioxide.—Mr. Darling contributes the following note to *The Chemical News* for June 27:—"Most lecturers must have experienced disappointment in attempting to collect solid carbon dioxide in quantity by means of the metallic box sold for the purpose. This arrangement is inefficient for two reasons—firstly, being made of thin metal and possessing a large surface, it affords every facility for the passage of heat from the atmosphere to the interior of the box; and secondly, the meshes placed in the handles are not sufficiently close to retain the particles of solid. Far better results are obtained by the method of tying a piece of flannel round the nozzle of the cylinder, although in this case also a large quantity of the solid escapes through the single layer of flannel.

"The following method, which, to the best of my knowledge, has not previously been published, will be found to give excellent results:—A piece of coarse flannel (such as is used for floor-cloths), about fifteen inches square, is rolled round a piece of rod or tubing 1¼ inches or more in diameter.

"The rod is partially withdrawn, and one end of the flannel bent over on itself, and tied with string. The rod is then completely removed, and the other end of the flannel tube tied with string round the nozzle of the CO_2 cylinder. The gas is then turned on for a short time, until the whole length of the flannel feels hard to the touch. On cutting the strings, and removing and unrolling the flannel, a solid rod of carbon dioxide, much denser and harder than that obtained by the usual methods, and about eight inches long, will be found. This may be kept for a considerable time rolled up in the flannel, or may be transferred to a Dewar vacuum vessel, and used for several experiments.

"I have used this method for some time for lecture purposes, and on occasions when a quantity of solid carbon dioxide has been required for cooling purposes, and have found it uniformly successful. There is no restriction as to the diameter of the rod round which the flannel is wound, providing the material is large enough to pass four or five times round the rod. The efficiency of the method is no doubt due to the retention of the finest particles of solid, owing to the several layers of flannel through which the gas must escape, and also to the heat-insulating properties of the material, which serve to protect the solid from extraneous heat. The preparation of solid carbon dioxide by this method will be found to form a most striking lecture experiment."

Combination of H_2S with Al_2Cl_6.—In *Comptes Rendus* for June 16, M. Band gives the following account of this interesting combination. By acting upon anhydrous aluminium chloride with liquid sulphuretted hydrogen, he was able to bring about a combination of the two bodies, with the result that two separate compounds were produced. One of these was $Al_2Cl_6 . H_2S$, a substance found to be stable at ordinary temperature and pressure. The other was of the composition represented by the formula $Al_2Cl_6 . 2H_2S$. The stability of this compound was very slight, as it dissociated at 45° below the zero of the centigrade scale.

The Atomic Weight of Uranium.—The results of a redetermination of the atomic weight of uranium by Professor T. W. Richards and Mr. Merigold are published in a recent number of the *Proceedings* of the American Academy of Arts and Sciences. Of previous determinations the only one worthy of serious consideration is that of Zimmermann, who in 1886 found the value 239·59. Zimmermann's method, based on the preparation of pure UO_2 and its conversion into U_3O_8, appears likely to give too high numbers, owing to the difficulty of obtaining the lower oxide free from occluded gases and also of oxidising it completely. After much preliminary work and a long search for suitable substances, Messrs. Richards and Merigold chose the analysis of uranous bromide as the basis of their method. The preparation of pure uranous bromide and its manipulation present considerable difficulties. Its analysis was effected by first oxidising it to uranyl bromide by means of hydrogen peroxide, and then precipitating the bromine by means of silver nitrate. The results showed satisfactory concordance, and led to a conclusion expressed by the authors as follows:—"If oxygen be taken as 16·000 and bromine as 79·955, the atomic weight of uranium appears to be not far from 238·53." It is remarked that, although this number differs by more than a unit from that given by Zimmermann, the percentage difference (0·45) is smaller than many which have often been passed unheeded in the case of elements of smaller atomic weight. It is, however, a noteworthy difference, and the probability seems to be that Zimmermann's number was too high. The paper of Messrs. Richards and Merigold brings to light many interesting facts about the chemistry of uranium.

SCIENCE NOTES.

(*Continued from page 49.*)

Effects of Solar Phenomena upon Rainfall.—To trace, if possible, a connection between solar and terrestrial weather, an extremely simple case, the south-west monsoon in India, was first investigated for the period 1877 to 1886. Marked pressure changes and heavy rains were found to occur in the first years following the mean condition of the sun—that is, in 1877 and 1882–83.

When the rainfall for the whole of India for the period 1875–96 was examined, similar rainfall maxima, though not quite so well marked, on account of the more complicated conditions, were found to occur in 1878, 1882, 1889, and 1893. By far the greatest maximum was obtained in 1893, in which connection it is interesting to note that in that year 1,430 millionths of the solar surface were covered with spots, as compared with 1,160 millionths in 1883 (previous cycle). The Himalayan snowfall and the rainfalls of Mauritius, Batavia (Java), and the Cape also exhibit maxima following upon the mean condition of the sun, so that it seems probable that changes in solar temperature do exert an influence upon terrestrial weather. It seems justifiable to attribute the increased rainfall at stations around the Indian Ocean to a common cause. The special conditions to which they may be attributed are not yet determined, but it is suggested that the additional rainfall about 1878 was due to "the reduced solar temperature so modifying the atmospheric pressure that the high-pressure belts south of the Mauritius may have been broken up, and thus have allowed cyclonic winds from a higher latitude to increase the summer rains." On the other hand, the increased rainfall, when the sun was increasing in temperature, as in 1882 and 1893, is attributed "to the action of the excess of solar heat on the equatorial waters to the south of India," and not to an abnormal effect on the south-east trade winds.

Further evidence in support of this connection between rainfall and solar temperature is supplied by an examination of the Indian famine periods, which are found to cease in those years in which the sun reaches its mean temperature. By assuming eleven years as the period of the solar cycle, and counting backwards from 1885–86 and 1891, the middle years of two successive famines, there is obtained a series of dates all of which were years of famine. Moreover, the sun's temperature reached a mean in 1892, being then on the increase. It should have decreased, and again been at a mean temperature in 1897–98, but had not done so by the end of 1900. In this connection the prolongation of the Indian famine of 1899 beyond its usual limit is noteworthy.

NORTH LONDON COLLEGIATE SCHOOL FOR GIRLS.

On Friday, July 4th, the Bishop of London presided at the annual prize-giving of the above school. The girls first sang a hymn, "O God, our help in ages past." After a short prayer, offered by the Rev. A. J. Buss, they sang again, this time a song, "The Fairy Godmother." Then followed the head mistress's report. After this another song was sung, "As it fell upon a day," and then came the distribution of prizes by the Countess Grosvenor. The girls having again sung, the bishop rose to say a few words. The honoured name of Buss, known to him already in East London, he now found to be no less honoured in North London. This was one reason of the great pleasure it gave him to come to the school; another was that it was a pioneer school. Common as high schools are to-day, it was this school that began the whole movement. He then spoke of the influence for good such a great school possessed—an influence affecting the home life of wives, mothers, and sisters, as well as that more public life now open to women in so many capacities. Mr. Latham proposed a vote of thanks to the countess and the bishop, and the proceedings terminated with the hearty singing of the National Anthem.

There were on the platform, besides the countess and the bishop, Lady Florence Bridgman, Mr. Latham (the Master of the Cloth-workers' Company), Miss Ridley, Miss Paget, Mr. Horne, Mrs. Hill, Rev. A. J. Buss, Rev. Septimus Buss, Rev. H. L. Paget, Rev. G. Tiley, Rev. H. Cart, Dr. Garnett, Mr. Garrod, Mr. Willock, Dr. Mott, Miss Chessar, Miss Newton, Dr. and Mrs. Willis, Miss Lawford.

OUR COMPETITION PAGE

OUR FRENCH AND GERMAN PRIZE COMPETITION.

Prize Editor—W. T. THOMPSON, B.A. (LOND.), *French and German Honours.*

Important to Scholarship, Certificate, and London Matriculation Students.

WE should like to specially direct the attention of our readers to the fact that the Board of Education, in the Syllabuses for the Scholarship and Certificate Examinations 1901 and 1902, requires "no set books" for French and German. Students preparing for these examinations, as well as students for London Matriculation, could not do better than attempt month by month the pieces set for translation here. They are from the best authors, and of varied character. A competitor who does not gain a prize can derive considerable benefit from the exercise. A study of the successful competitor's translation, and of our remarks, will help him to see where he might have done better. If desired, his paper can be returned (fully corrected) by enclosing six stamps together with a stamped and addressed envelope. Corrected papers cannot be posted until after publication of the journal.—ED.

RULES.

1. All translations should be **posted not later than September 8,** and addressed:—*Prize Editor*, Office of THE PRACTICAL TEACHER, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. No competitor may take the prize offered more than once in three months.

FRENCH PRIZE COMPETITION.

A Prize of One Guinea will be given for the best translation into English of the following extract:—

Le Français est obligé d'user d'abord une partie de ses forces pour gagner à son projet sa femme et ses fils adultes, pour vaincre les oppositions renaissantes qu'il rencontre chaque soir à son foyer. La femme française a l'esprit clair, de la raison et du courage pour son propre compte; son mari trouve auprès d'elle un conseil judicieux, quelquefois une critique mesquine, souvent un concours raisonné, rarement le réconfort moral d'un plein assentiment. Trop souvent il se décourage, ou bien le temps s'écoule et l'occasion lui échappe. S'il passe outre, il ne sent pas derrière lui une retraite assurée en cas d'échec, un lieu où se reprendre auprès d'une compagne qui croit en lui sans examen, et qui lui rendra la foi en lui-même. La fermeté de ses résolutions, la sûreté de sa main sont profondément atteintes. L'Anglais ne rencontre chez lui ni opposition ni résistance. Ses volontés sont indiscutées. Ses fils, présents, les respectent, ou, absents, les ignorent. Sa femme s'y associe. Il y a dans cette autorité si nettement reconnue, dans cette autonomie si entière, dans cette responsabilité si haute, le principe d'une force, d'une gravité, d'une énergie peu communes. La famille qui a plié l'Anglais enfant à la discipline, qui l'a habitué adolescent à la liberté et à la responsabilité, le forme par le rôle de père et d'époux à l'initiative et au commandement. EDMÉ BOUTMY.

RESULT OF THE JUNE COMPETITION.

French.

The prize is awarded to "Stella Vere," the pseudonym of Miss A. Kilburn, Penkridge, Staffs.

First Class.—Day Dawn, La Printanière, Oakover, Quasimodo, Kerboga, Petit oiseau, Agaznog, Beth, Mathetes, Ambrosia, Sunagonizomenos, Hessary, Esmond, Ernemont, Chemineau, Poulton, Epi, Hélène, Polly, Logic, Chaos, Villanus, Thames, Cora, Jungwolfia, Hope, Novus homo, Moffat, Elf, Hilaris, Gwynne, Cosette, Aiphos, Brownie, Raimeis, Catriona, Tartan, Aijesbe, Débutante, Punch, Marigold, Nil desperandum, Exeter I., Regina, Solway, Poincy par Trilport, E.S., Bull-dog, Kettering, A.S.W., Glasgow, Perdita, Grandbourg, Ernse, Verdant, Florothy, Marly, Boccaccio, Romola, Eurydice, H.A.D., Jane, Darling, Capuchin, Jay, Agricola, Marguerite, Astre, Calisa, E.S.G., Holloway, Xap, Marwenne, Southwood, Spero, Gnothi seauton, Dox Sorley, L'anglais, Frost, Bumblebee, Poppy, Angela Messenger, Aremjay, Cuckoo, Ellan Vannin, Undine.

Second Class.—Portia, Aline, A.M.S., S.H., Galtee, Ricardo, Nairn, Laurence, Pompilia, Viscount Forster, Semper eadem, Nellie, Ephesian, René, Daisy, Gert, Hovan, Greta, Alcar, Lorette, Carillon, Jessamine, Fleur-de-lys, Poynton, Pitlessie, Lavengro, June, Onze ans, May, Le commençant, Léonie, Aera, Vinovia, Nemo, North, Anxious, Revilo, Sunflower, L.R., Dif, Evelyn, Dot, Puss, Eve Effingham.

Third Class.—Keating, Topsy, Penybont-ar-Ogwy, Swallow, Loose hair.

Report.

The extract was a trying one, but many good translations have been sent in. It was by no means an easy matter to decide which of the first seven or eight competitors was entitled to the prize. *Assistant*, of course, puzzled some, and *question*, in the sense of torture, was a stumbling-block to others. *Quand elle entre, etc.*, was translated by one aspirant as "entering the room in which she expects to be proposed to." *Tarasques* was a difficulty, as the word is not found in any dictionary. I have accepted the original and the Anglicised form "tarask." Others have translated it as "dragon," "gnome," and "imp," all of which are more or less faithful renderings.

French Prize Translation.

In Victor Hugo, seeing becomes sometimes so intensified that he sees more than actually exists. Apparently, in him, all other sensations are changed into that of sight. Thus at times, to quote his words, "the ear also is able to see;" as, for instance, when, being present on the morning of some great festival, at the outburst of a peal of bells from the towers of Notre Dame, the poet saw, "rising from each belfry, a column of sound, a cloud of harmony." In certain cases his hallucination, and that of his creations also, is so great that inanimate objects are endued with the power of motion; vagabonds, coming up to the attack on the cathedral, see, high on its towers, "serpents which appear to laugh, gargoyles that seem to yelp, salamanders breathing in the midst of flames, and imps sneezing among smoke." Esmeralda, too, on entering the Inquisition Chamber, sees the instruments of torture "rise and come towards her from all sides, to climb upon her body that they may bite and pinch her." If Victor Hugo owes much of the success of his work to his gift of intense vision and vivid idealisation, he owes no less to his unapproachable genius in the art of writing. No other has ever interpreted his thoughts by means of a richer vocabulary, nor shown more marvellous skill in fashioning his phrases; none has known like him how to obtain effects with words, such as seem generally reserved to the plastic arts, moulding language so as to give it relief and brilliancy.

STELLA VERE.

THE EDITOR'S TABLE

AMERICAN BOOK COMPANY.

Navigation and Nautical Astronomy. By Eugene L. Richards, M.A. Part I. of Mr. Richards's book treats of navigation by dead-reckoning, and this part is very well done. The second part deals with nautical astronomy, teaching how to determine the exact position of a ship by reference to latitude and longitude, and by observation of the heavenly bodies. Both in subject-matter and in get-up the book is worthy of praise, and can be safely selected as a reliable *vade mecum* by all students bent upon understanding the stars as the sailors' guides.

Latin Composition. By Anna Cole Merrick, A.B. This little book is very nicely got up. We cannot approve of a system which constantly refers a beginner to a grammar-book, instead of referring him directly to the author whom he is studying. The long lists of references to grammar-books at the beginnings of the exercises would be very depressing, we fear, to us, if we were beginning Latin sentences with a book like this. We think, too, that it is a pity to print such words as *persuasus* and *perventus* as participles of *persuadeo* and *pervenio* respectively.

Shakespeare Studies: Macbeth. By Charlotte Porter and Helen A. Clarke. We heartily recommend this book to students of the great tragedy. Without saying that the authors have exhausted the subject, we may safely affirm that the student will look upon the play with far greater interest and critical capacity after reading the excellent pages of this treatise. After criticising the plot and progress of the play, the characters and their relations, the supernatural in *Macbeth* and its relation to the plot, some moot points are suggested for discussion, and the opinions of all the important Shakesperian critics are quoted to elucidate them. The materials from which the play was constructed are given in the form of extracts from Holinshed, Bellenden, Scott, etc. The whole book is most interesting.

E. J. ARNOLD AND SONS.

A.L. History Pictures. No. 1. Ancient British Life; 10. Battle of Hastings; 30. Dismissal of Wolsey; 40. The Armada in the Channel; 50. Landing of the Pilgrim Fathers; 80. Nelson at Trafalgar—The Fatal Shot. This is a really fine set of pictures illustrating epoch-making events in English history. The subjects are well selected and most ably treated, while the way in which the artist's drawings have been reproduced leaves nothing to be desired. They are beautiful examples of colour printing, and while striking, they are by no means gaudy, but are very suitable for school decoration. The details are guaranteed correct by the publishers, even to the buckles of the shoes and the queues of the sailors.

It is surprising what a vast amount of information the artist has managed to pictorially portray in a single picture without producing the impression of overcrowding, yet the treatment is so bold that the pictures can be seen from every part of the class. Only the above six of the set are yet published, but, judging from these, we can confidently recommend them all as unrivalled aids in the teaching of history.

A.L. Genealogical Chart. This chart shows in a novel and striking manner the descent of the royal line from Egbert. The ordinary genealogical trees are given, but in addition to these, forming an enclosing circle, are the portraits of the various kings and queens, each line being differently coloured. The pictorial representation here given will assist the memory and considerably lighten the labour of those who will be required to "trace the descent of Edward the Seventh."

GEORGE BELL AND SONS.

Bell's Miniature Series of Painters. Watteau, by Edgcumbe Staley; **Holman Hunt,** by George C. Williamson. The two volumes of this dainty series now under notice are of surpassing interest. Each artist had marked individuality, and created entirely or in part a distinct school. Written without a trace of pedantry, and yet brimful of information, the booklets should be welcomed and read by all who have any interest in art. It is somewhat surprising to learn that the brilliant pictures of Watteau, portraying all that is light, gay, and gallant in life, were the work of an artist by nature morose, sullen, and uncompanionable. Concerning Holman Hunt, we learn the long struggle of his early youth, the formation of the famous Pre-Raphaelite Brotherhood, the intensity of his convictions in art, and are given a most enlightened criticism of his style and work, showing its successes and failures.

Each book is enriched with several excellent reproductions of typical works by the artists, accompanied by full notes.

Since we received the above the following additional volumes of this series have come to hand, namely:—

Holbein. By Arthur B. Chamberlain.
Reynolds. By Rowley Cleeve.
Lord Leighton. By G. C. Williamson, Litt. D.

There need be no halting between two opinions as to the merits of these handy little volumes. Everything is in their favour. The price could not well be less; they are written in popular language, devoid of all technical terms; they give all that is necessary of the life and work of the painter to make one thoroughly understand the conspicuous qualities of his work, and thus render visits to public galleries at home or abroad an educational mission, instead of mere aimless picture gazing. In short, there is in them just what every well-read man or woman should know about the painters and their most famous pictures. The illustrations are well selected and very clear. We can cordially recommend the series; they will provide many a pleasant hour's reading.

BIGGS AND CO.

Graduated Exercises in Elementary Practical Physics. By C. J. Leaper. This is in some respects a good attempt to describe a series of elementary experiments in the various sections included in the term "practical physics." The experiments indicated require, as a rule, the use of comparatively simple forms of apparatus, and the student who carries out the experiments as suggested cannot fail to get some clear ideas on the subject. At the outset, we are informed that the book is intended for those students who have had very little mathematical training, and who have access to few books of reference. Unfortunately for such readers, the formulæ adopted in many cases is far from being simple, clear, or accurate. Space will only allow reference to be made to a few items—thus, on page 15, the acceleration of a moving body is given by $(V_f - V_i) \div T$, where V_i represents the initial velocity, and V_f the velocity after a time T. This equation is, of course, only applicable to the case of *uniform acceleration*, but *variable* acceleration is not even referred to. Again, on page 20, in describing the Atwood's machine, we find the following: "W_t = weight of *whole* moving mass—that is, weights, pulley, sheave, rider, cord, and overweight; then kinetic energy $= \frac{1}{2} W_t V_f^2 \div g$." This obviously assumes the physical impossibility that all parts of the pulley are moving with the same linear speed as the cord.

In the sections dealing with heat, light, sound, magnetism, and electricity, some very good and instructive experiments are described. These, together with diagrams and photographs of actual apparatus which may be used in each case, will be of the greatest use both to teachers and students.

ADAM AND CHARLES BLACK.

A First Course of Essay-Writing. By J. H. Fowler, M.A. This book of nearly forty pages contains some valuable help for the children of the upper standards of our schools. Together with suggestions as to subjects, it contains excellent advice by way of cautions and hints. The "cautions" deal with common errors, and are exceedingly useful.

Waverley. (School Edition.) We are glad to welcome another volume in this valuable school series. Clear type and careful notes make it specially suitable for the student. The historical introduction is somewhat marred by evidences of haste in the composition.

Introduction to the Study of Physics: Vol. I., General Physical Measurements. By A. F. Walden, M.A., and J. J. Manley. This is another addition to an already long list of books on practical physics, and contains part of a course

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of work in elementary physics which the authors have found useful in their own teaching.

As stated in the preface, it is not intended to be used either as a text-book of theoretical or as a laboratory manual of practical physics; but, as the title implies, the book deals chiefly with the fundamental units of length, mass, and time, and the derived units of area, volume, and density.

Commencing with the measurement of length, clear and concise instructions are given in the processes of making scales and verniers, together with explanations and methods of using such useful laboratory instruments as the screw or micrometer gauge, spherometer, etc. These are followed by chapters dealing with area, volume, mass, and density. The subject of fluids, including gases, receives careful attention, the same remarks applying to the chapters dealing with time and its measurement.

In each of these sections suitable, easily performed, and simple experiments are indicated; and not only is the necessary apparatus fully described, but, in addition, all the precautions which must be attended to so as to ensure its safe use and preservation are so well explained that a student may probably be able to safely perform the experiments without more than a general supervision on the part of a teacher.

The printing and illustrations are alike excellent.

Descriptive Geography from Original Sources: North America. By E. D. and A. J. Herbertson. The title of this book is a most appropriate one. By dint of great care and unceasing search the authors have collected a huge mass of matter relative to North America from the writings and reports of travellers and such like, which are so varied and numerous as to claim their thanks to the extent of nearly a whole page of the preface. The compilation of such material must have caused the editors much trouble and anxiety, but we hope they will be amply rewarded for their pains by the success the work must achieve. We doubt if a better or greater book has been published; it is supplied with a good index, and a useful chapter on bibliography.

BLACKIE AND SON.

Blackie's South Kensington Drawing Cards. Sets 1 to 6. These are reduced examples from the large series of coloured charts. Sets 1 and 2 are examples of common objects drawn in outline only; sets 3 to 6 are coloured representations of ornament, flowers, fruits, etc. Some of the examples are very old, but they may not be worse on that account.

The Georgics of Virgil: Book II. Edited by S. E. Winbolt, M.A. (Blackie's Illustrated Series.) Our poet Dryden, no mean judge, spoke of the *Georgics* as "the best poem of the best poet." To all those who love the quiet joys of the country, the farm, and the garden, Virgil's great work must be a constant pleasure. In style the *Georgics* are perhaps the most highly finished and perfect example of hexameter verse, the *Æneid* being robbed by Virgil's death of the final polish, of which he was so careful an exponent.

A pleasing feature in some of the recently-published school editions of the classics is the serious effort to treat them not merely as examination subjects or as collections of examples of uncommon grammatical constructions, but as precious gems of literature. Mr. Winbolt's preface is a notable example of this. Passages are carefully selected to show the beauty of epithet and illustration, the suitability of rhythm to thought, the effect of a well-placed pause, and the like. For purposes of comparison and illustration the editor draws freely on the English poets—another good feature in the best modern editions of the classics.

Great attention is given to the versification—not merely to the classification and naming of all the variations of the hexameter, but thoughtful and helpful notes on the effect of each of these upon the music and the rhythm of the lines.

The illustrations are, as usual, taken chiefly from the antique. Much may be said in favour of this course. But we think that a few drawings of the wonderfully beautiful scenes in the vineyards and olive gardens of Italy would harmonise with the note of the poem better than unintentionally humorous antiques.

Livy: Book XXI. G. G. Loane, M.A. (Blackie's Illustrated Series.) In the introduction are articles on Livy, his works and his place in literature, and a historical section giving the outlines of the times wherein lie the events here narrated. Two maps illustrate the geography of the war; Hannibal's probable route might have been added with advantage.

The book has the usual high-class illustrations of this series; there are excellent portraits of Hannibal and Scipio from antique busts, and very numerous sketches illustrating chiefly military technicalities. The full notes deal rather with the accurate elucidation of the text than with syntactical matter. It is somewhat difficult to see the reason for the inclusion of the appendix on Roman religious beliefs; in the illustrations, also, the frontispiece taken from the Bayeux tapestry seems hardly suited to the book.

Discernenda Latina. J. S. Howell. A very handy little collection of odd difficulties in the Latin vocabulary; it would be a useful book for the final revision before an examination, more especially for young students. There is a very good collection of words somewhat alike in form, but differing in meaning, the causes of many a mistranslation. For instance, here we have such groups as *cedo, caedo, cado; aeger, ager, agger; aura, auris, aurum;* and so forth. Useful items are the pages dealing with different constructions following the same word, and words of same meaning governing different cases.

Considerable assistance in composition can be got from the list of miscellaneous idioms, and from the full series of examples illustrating the various uses and renderings of the prepositions. This last feature is particularly good. Less desirable is the collection of metaphors and proverbs, which in Latin authors are decidedly rare, excepting in satires and comedies, which are unlikely to be included in young pupils' reading. It would have been more useful to show how very generally an English metaphor must in Latin be translated by plain fact.

Virgil: Æneid, I. By H. B. Cotterill, M.A. This is an excellent book. The notes are very full and interesting. We do not think that any one beginning to read Virgil for the first time, unless he has taken up the study of Latin at an age considerably later than the usual one, will be able to appreciate Mr. Cotterill's work. But the book is none the less valuable for that. Above all, we are heartily glad to see an editor who constantly appeals to the literary before the merely grammatical sense in his readers' minds—we can think of so many editors and teachers who seem more anxious to impress on their pupils that Virgil used "hendiadys" and "chiasmus" than to help them to understand why he is to be read and studied at all.

Virgil: Æneid, VI. H. B. Cotterill, M.A. (Blackie's Illustrated Series.) The dominant feature of this edition is the keen appreciation of its editor for the beauty and nobility of the poem, and his efforts to impart the delight to his readers. This, we take it, is the highest possible aim; unfortunately, in the stress of working for examinations, too few are able to attend sufficiently to this, and an exquisite poem is reduced to the level of exercises in grammar.

This is the famous account of the descent of Æneas into Hades, and here and there are parallel passages from Dante's *Inferno*, and comparisons of their treatment of similar things. The notes are copious—almost too copious for a schoolboy's use—and are generally devoted to illustrating and expanding the poet's meaning; but grammatical points are not neglected.

There are several appendices, and each one is of value to the book. In this particular book are accounts of the Sibyls, of the ancient beliefs concerning immortality and future rewards and punishments, and several other points to assist in its more perfect understanding.

Among the illustrations are some beautiful modern views of places in the district where the poet lays his scene.

The vocabulary is somewhat short. We believe that a vocabulary should be full enough, if included at all, to save the use of a dictionary.

Cæsar: Gallic War, Book III. By John Brown, B.A. This is by far the best edition of the third book of Cæsar's *Gallic War* that we have come across. The print is clear and the chapters well divided, with a short summary at the head of each. The various campaigns can be read separately, without giving the pupil any of that depressing feeling of incompleteness that is so often produced by reading part only of a book. There are abundant and excellent illustrations, and there is a full and interesting introduction. Everything has been done that can in any way bring home to the reader the details, as well as the broad aspects of a Roman soldier's life and work.

W. BLACKWOOD AND SONS.

Cæsar: Gallic War, I. to III. By J. M. Hardwich, B.A. (Blackwood's Classical Texts.) Originality in an edition of Cæsar's *Gallic War* is a quality hardly to be expected. The principal features of this edition are, firstly, two good coloured plates of costumes, arms, etc., one of the Gauls and one of the Romans; secondly, there are good clear maps of the principal scenes of battle and siege, with colour to help in distinguishing the positions and movements of the contending forces; thirdly, the notes are such as a schoolboy appreciates—aids to translation; and, lastly, there is a nice large map attached to the edge of the cover in such a way as to be always at hand.

Xenophon: Anabasis, I. and II. By A. Jagger, B.A.

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(Blackwood's Classical Series.) A very good coloured frontispiece, representing a Greek warrior fully armed, commences the work, and a map concludes it. The introduction describes and represents the arms, armour, military formations, etc., of the Greeks and Persians. There is also given a life of Xenophon, and of his hero, Cyrus.

Some good appendices distinguish this from among the vast number of editions. There is a list of principal parts of irregular verbs occurring in the book, a page on the Greek particles, and a full list of Greek military terms and phrases used by Xenophon. Altogether it is a capital little book, one of those which makes one wonder at the progress during the last generation in the quality of our school books.

BURNS AND OATES.

Floral Design in Colour. Sets 1 and 2. By F. F. Lydon. There are some very good points about this series. The drawing is uniformly good, and the designs, though somewhat complicated, are interesting. In some instances the colour leaves much to be desired, but in publications of this kind there is always a great difficulty in securing really good colour. When one tint has to do duty for several examples, it is difficult just to hit upon a tone that suits every design. Teachers of evening continuation schools will find these sets useful.

CAMBRIDGE UNIVERSITY PRESS.

Macbeth. By A. W. Verity, M.A. Mr. Verity deservedly enjoys a high reputation as an editor of Shakespeare, which this edition of *Macbeth* will undoubtedly increase. It is distinguished by a wealth of information, clear, concise, and scholarly annotation, and some exceedingly useful appendices.

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Twentieth Century Readers: Book IV. Any child who fails to be interested in such a book as this must indeed be dull. Not only is the matter attractive, but the illustrations are particularly beautiful. The chapters on "B.-P." will be eagerly devoured by the average boy.

English Manuals: Book VI. The Code requirements in English for Standard VI. are fully covered by this little book.

The Sole Survivors. By G. A. Henty. This is a "Continuous Reader" dealing with the life of the early Virginian settlers, told in Mr. Henty's inimitable style.

CHAPMAN AND HALL.

The Art Worker's Quarterly. Both Mr. Paulson Townsend, the editor, and the publishers are to be congratulated on the second issue of *The Art Worker's Quarterly*. Working craftsmen cannot fail to derive great help from the journal, as the designs are all of such a practical nature. Take, for example, the panel for wood carving, by Charles H. Rogers. Even accomplished workers may learn much from the simple yet pleasing treatment of this design. Equally good, workmanlike, and clear are the designs for cut and embroidered linen, for drawn thread and lace, as well as the working drawing by Mr. Phillips for the carved panel shown in No. 1. Indeed, the eminently *practical* nature of the publication should ensure its success.

Examples of Elementary Drawing and Design. By G. Woolliscroft Rhead. A magnificent set of examples, reflecting the highest credit on author and publishers alike. Messrs. Chapman and Hall's name is synonymous with excellence in production, but in this issue they have surpassed themselves. There are two sets—twenty-four large sheets, imperial size—containing respectively twelve examples of plants and twelve examples of natural objects. The author states that "in each instance Nature is entirely responsible for their invention or design," and claims nothing in respect of them, except judgment in the selection, and emphasis of the decorative qualities of the originals. To appreciate what this latter means, one must see the examples, and admire the most excellent drawing and splendid rendering of detail, without the least confusion. In each set some drawings are given in black and white on a toned ground, others being in black outline only; but all alike are excellently drawn. As models of what drawings of this character should be, they are worthy of a place in every school of art.

THE CLARENDON PRESS.

Scenes from Sophocles's "Antigone." By C. E. Laurence, M.A. The editor has printed in his Greek text what seem to him the main scenes from the *Antigone* of Sophocles, and has supplied the gaps thus produced by means of short summaries in English. There is an introduction dealing with the Greek drama in general, the life of Sophocles, the metres used by the poet, etc. We think that some of this is condensed far too much, and that Mr. Laurence has left either not enough or too much to the form-master all through the book.

M. H. GILL AND SON.

Terra Paterna, Vale! By the Rev. N. J. Brennan, B.A. A Latin verse translation of "Childe Harold's Pilgrimage," with a few other poems. Good models of elegant rendering into Latin verse; the metres chosen are those nearest to the metre of the original.

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Athenæum Press Series: Carlyle's Heroes and Hero Worship. By Archibald MacMechan. This is by far the best edition of *Heroes and Hero Worship* we have seen. Not only are the notes particularly full and helpful, but there is an excellent introduction which carries us back to the days when the lectures were given. The editor has much to tell of the circumstances under which Carlyle lectured to his audiences, and of the reception accorded to him. We wish this book the success which it eminently deserves.

Secrets of the Woods. By W. J. Long. To any one but slightly interested in natural history, this little book is fascinating. It is a poem in prose. The author takes us with him into the woods, and reveals to us the manners and mode of life of the field-mouse, otter, kingfisher, red squirrel, etc. Under the spell of his charming style, we drift out of the study and off into the Maine woods, where from the birchbark canoe we watch in wonder the comedy and tragedy of animal life. It is a new world that is presented to us, and our guide leaves us all too soon, the disappointment being alleviated by a promise of a further trip on some future day. Every boy should read this book.

HACHETTE ET CIE.

Le Secret des Tilleuls, par Mme. Chéron de la Bruyère. This is a children's story-book, narrating the misunderstandings which arise from the concealment on the part of a boy of an act of disobedience. By accident he breaks a valued chronometer of his father's, and suspicion falls on other persons. The authoress introduces an English family, and, as usual with our Gallic friends, attributes to them many of the *gaucheries* of which we as a nation are innocent. We have yet to meet an Englishman who, though able to converse fluently in French, habitually says *je avais* and *je ai*.

Clark's Series of Civil Service Text-Books: Aids to the Study of English History. The path of the student is made easy nowadays by specially-written text-books and carefully-arranged synopses and digests. Whether this is the best mental training or not is a debatable subject. Apart from this, the book before us is one of the best of its kind we have seen. It directs attention to the salient points, tabulates, classifies, annotates in an excellent manner, and provides a useful set of examination papers and model answers.

The Intermediate English Grammar. By C. Hart, B.A. This grammar has been compiled by an experienced teacher. It bears evidence of much care and thought. There are no superfluities. Whilst dealing with a subject that has been pretty well expounded, Mr. Hart contrives to introduce much that is original as well as useful. Special attention is devoted to the idiomatic use of prepositions, punctuation, composition, and derivation. We think the book deserving of success.

J. HEYWOOD.

Elements of Botany. By W. J. Brown, M.A. (Lond.). Much progress has been made in recent years in our knowledge of plants, and hence the necessity for keeping botanical text-books up to date. John Heywood is issuing a new and enlarged edition of an elementary text-book which has already run through four editions. This fact alone would lead us to expect a volume of considerable merit, and, on examining it, the expectation is fulfilled. It is not written to enable students to pass any par-

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ticular examination, for the instruction is much fuller than is needed for either the elementary stage or for the London Matriculation; but it has been written to serve as an introduction to the study of botany in all its branches. There is no attempt here to avoid the use of technical terms. They are necessary in any systematic study of botany; but we think several might with advantage have been omitted from an elementary volume. The derivation is, however, given in each case; and provided a student learns a few prefixes and roots, it is surprising how the difficulties in botanical nomenclature almost entirely disappear.

The matter is well arranged. The general structure of a plant is illustrated by a description of the common crowfoot. The stem, root, and leaves are then fully described as seen by the naked eye, and in each case a minute description follows. The chapter on vegetable physiology is full, clear, and up to date. The illustrations are in some cases excellent, in all cases correct; but in a few instances the excellent text deserves a better figure to illustrate it. On page 216 two references are made to Fig. 145 which are evidently intended for Fig. 144.

Though the present edition is entirely rewritten, we think the author has been well advised in adhering to the arrangement originally adopted. We are glad he has withstood the temptation to remodel it by beginning with the simplest plant forms and proceeding to the more complex. This may seem a more logical arrangement, but it is not suitable in an elementary text-book on botany. We cordially commend this excellent edition to those intending to begin a systematic study of botany.

HODDER AND STOUGHTON.

Christian Study Manuals. Edited by Rev. R. E. Welsh, M.A. The manuals are three in number: **The Early Church, its History and Literature,** by James Orr, M.A., D.D.; **Ruling Ideas of Our Lord,** by Charles F. D'Arcy, D.D.; and **Protestant Principles,** by Rev. J. Monro Gibson, M.A., D.D. They are all well written and clever little treatises, and will appeal to Sunday-school teachers and those interested in church life and work.

English Composition. By G. H. Thornton, M.A. Forming one of the "Self-Educator Series," this book is intended to provide the isolated student with the means of improving himself in the art of expression and composition. This he can scarcely fail to do if he follows the advice given, and the exercises set on the many points dealt with. It is by a clear understanding of the common faults and weaknesses that they can best be avoided, and a student who has once acquired the power of readily detecting errors is not likely to commit them himself. We have much pleasure in recommending this book to our readers who want reliable assistance in this subject.

A. LEFÈVRE NFG., KRUSE, AND FREIHERR, HAMBURG.

J. H. Pestalozzi's Rechenmethode. Dr. Hermann Walsemann gives us a book on Pestalozzi's method of teaching number (Rechenmethode), in which we find a great deal that is both interesting and instructive. The book expounds—Pestalozzi's own words being continually quoted—the principles and manner of procedure which this great educator himself used. Whilst admiring some, we find fault with others—for example, the extent to which the tabulated work is carried.

The book is written historically—that is to say, it begins with the very first experiences Pestalozzi had with teaching number to his little son, and the experiments performed on him. Did or did not the name of the number convey any *idea* to his small mind? It was from these results and experiences that the "Rechenmethode" was developed. The writer shows how Pestalozzi taught first the value of the numbers as wholes by means of concrete forms, the abstract never being presented until the child's mind had some impression, notion, or idea of the number under consideration. From this the book goes on to show how Pestalozzi taught his pupils at quite an early stage to arrive at an intelligent understanding of fractions, by a systematic method of dividing wholes into halves, quarters, etc.

All infant teachers will find in this book much that is worth noting and adopting, and cannot but feel that it is an interesting study.

The second half of the book is devoted to a criticism of this "Methode," with explanations and experiments by the writer, showing that although there is much that is good in it, yet it is one rather of an enthusiast, or inspired educator, than that of a man who has logically thought out all his points. Pestalozzi puts at the beginning what his predecessors put at the end of education, for he *bases* his method on intuition (*anschauung*), for which, if for nothing else, his name as an educator is worthy of remembrance. The writer thinks the great fault of the "Rechenmethode" is the limitation of the objects of natural intuition. There follows a description of the Pestalozzian apparatus, and the results the writer himself obtained in his experience with Pestalozzi's method of strokes and dots in eighteen of the upper, middle, and lower schools. These experiments, as well as those with the fraction and other tables of Pestalozzi, are full of interest and real instruction. We heartily recommend their perusal to all who care about the psychological development of the child. The book closes with a very short and concise summary of the chief points of the Rechenmethode, and is altogether one which will be essentially useful to any true educationist.

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Complete Arithmetics. Course B, Books IV., V., VI., and VII., with Answers. Teachers working by this scheme will find these little books of great assistance. The examples are well graduated and diversified, and cover the whole syllabus in a very satisfactory manner.

Geometrical Drawing for Art Students. By J. H. Morris. A capital book. The first portion is too well known to need any explanation. Mr. Morris has now enlarged it to meet the present requirements of geometrical drawing—namely, the planning of ornament. An exceedingly useful chapter has been added in this section, making the book thoroughly up to date. We can strongly recommend the volume.

Stepping Stones for Teachers to Industrial Drawing and Design. By A. M. Bevis. We really cannot see that this book can do much in the way of teaching design either to teachers or children. It is planned somewhat on the old kindergarten work on checkered paper, which by common consent is now not considered good. The patterns given would lead to so much cramped straight-lined work, and are in themselves so often wanting in beauty, that, as far as art training, they would mark a retrograde step. A simple curved element repeated a few times would be of much greater value both educationally and for the teaching of drawing.

Elementary Practical Exercises on Sound, Light, and Heat. By Joseph S. Dexter, B.Sc. Pp. xv + 284. This book contains a number of elementary experiments illustrating the fundamental laws of sound, light, and heat. The subject of heat is treated first, as presenting least difficulty to the beginner. One hundred and twenty pages are devoted to this portion of the subject. The following ninety-six pages are devoted to light, and this is, perhaps, the weakest part of the book. The phraseology is often loose, and sometimes misleading. Thus, under the head, "Nature of Light," the properties of light rays are alone examined. The student may be puzzled to know what the "refractory angle of a prism," mentioned in Experiment 135, p. 175, may be. The following sentence could bear a good deal of improvement:—"Then place the candle in such a position (to be found by trial) that, after striking the under surface of the mirror B, its image is seen reflected upwards when the eye is placed over the aperture of the top platform D." The student, after some puzzling over this sentence, may find out that it is neither the candle nor its image which strikes the mirror, but a ray of light. Fig. 112, p. 218, which is offered as an example to be copied by the student, incorrectly represents the refractive action of a biprism. The images are represented at a much greater distance than the object from the biprism. The final sixty pages are devoted to sound. The book makes no particular show of originality, and many would prefer a smaller number of experiments of a more accurate character. It would, however, if conscientiously worked through, familiarise the student with the elements of practical physics.

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Deductions in Euclid. By T. W. Edmondson, M.A. Pp. 206. This is a book whose purpose we can scarcely see, unless it be designed as a kind of supplement to the Euclid in "The Tutorial Series," to which it also belongs. It consists of a series of 258 riders, with full proofs appended. There is but little method in the arrangement, which follows Euclid's order in the main, and covers the ground of Books I.–IV. The proofs are concise and good, but not novel. No exercises are appended, and no inducement offered to make the student efficient in discovering his own solutions. To some extent there is overlapping with the Tutorial Euclid. The nine-point circle, for instance, is treated in both books, with considerable differences. But we write in the dark, because we do not know the object of the book. As an introduction to modern geometry it is, of course, worthless. By matriculation candidates who wish for further practice in worked riders, it may be welcomed, although it is enervating, because it does not encourage initiative.

The Tutorial Algebra: Part I., Elementary Course. By Rupert Deakin, M.A. Pp. vi + 443. This book belongs to the very admirable collection of mathematical works known as "The Tutorial Series." In most respects it is worthy of its position. It is clearly the work of a splendid teacher. Every page betrays an acquaintance with the follies and frailties of the human boy, and we do not doubt that the human girl would find her perplexities resolved with equal clearness. A whole chapter is devoted to "Mistakes Made by Beginners in Algebra," and no opportunity is lost of pointing out to the said beginners in what paths their feet are likely to go astray, and where they may safely walk. This being the case, we the more deeply regret that here and there the book is disfigured by extraordinary blunders, which make us doubt whether, despite the skill which Mr. Deakin displays in the handling of his subject, he is himself an altogether competent mathematician. On page 6, for instance, we find *index* and *power* repeatedly and carefully identified! There is neither precedent nor justification for this. The proof of the rule of signs on page 26 is simply grotesque. It runs as follows: "Suppose $+2\times-3$, or $-2\times+3$. Evidently the product will not be the same in either of these cases as in $+2\times+3$. Therefore we conclude that $+2\times-3=-6$, and $-2\times+3=-6$.....Again, suppose -2×-3. This is different from the last two cases, and we conclude that $-2\times-3=+6$." This is arrant nonsense. To mention no other consideration, we might argue that since -2×-3 is "evidently" different from $+2\times+3$, its value was -6, and continuing, on the strength of the same "evidently," that $-2\times+3$ was different from -2×-3, and therefore was $+6$. If the statement is meant merely as a help to the student, we can only say that such helps will blunt all the finer edge of his mathematical feeling. Chapter x., on "The Fundamental Laws of Algebra," is similarly vitiated by a lack of algebraical insight. Mr. Deakin fails to see, apparently, that the proofs he gives of the laws of commutation, etc., are valid only when the symbols he uses represent positive integers, and are strictly, therefore, arithmetical rather than algebraical. The same chapter introduces us to the remarkable symbols $\times\times$, $\times\div$, $\div\times$, $\div\div$, concerning which our author remarks, "These forms, however, are not often required in algebra," a fact which is pleasing, because they are absolute nonsense. On page 383 we have a venerable fallacy for which there is more excuse, seeing that every elementary text-book with which we are acquainted contains it, except one which we review in the present issue, and the "Introduction" of Professor Chrystal, which, if we may be permitted an Irishism, is not elementary: "If r is a proper fraction.....r^n will be infinitely small," when n is infinite. This theorem, if true, would prove that when n is infinitely great $(1-1/n)^n=0$, whereas we know that it is $1/e$.

Where so much is good, it seems a poor return to go on complaining. But we must note further that the treatment of literal equations before fractions is logically unsound; that the retention, even as an alternative, of the name "impossible" for $\sqrt{-1}$ is to be deprecated, since this quantity is no more "impossible" than -1, a quantity *one less than zero;* that the distinction of quadratics into pure and adfected has nothing but history to recommend it; that the venerable phrases *alternando, invertendo,* etc., might at least have smaller print, if they must still cumber the ground; and that the "sum to infinity" of a geometrical progression cannot be scientifically treated without the introduction of the idea of limits. We do not like the cancelling of algebraical expressions to be shown. It disfigures the text. But we admit that this is matter of opinion.

The course is the ordinary one, treating of all subjects which are generally treated previous to the binomial theorem, and containing an elementary chapter on graphs, which looks like an afterthought. We strongly recommend that the book should be thoroughly revised by some competent independent mathematician. If this is done, it contains at least the possibilities of a most valuable text-book. As it stands it cannot be recommended.

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King Alfred, Patriot Saint of England. (A Sermon preached in Winchester Cathedral on Sunday, June 23, 1901, at the Summer Assembly of the National Home-Reading Union, by Charles William Stubbs, D.D., Dean of Ely.) In commemoration of the millenary of Alfred the Great, the National Home-Reading Union fixed its summer meeting this year at the royal city of Winchester, and on the second day of the visit the above sermon was preached in the Cathedral by Dean Stubbs to the members assembled there.

It is a popular rather than a historical account of the great king, dealing chiefly with the ideal side of his life, as disclosed to us by the five books which he himself wrote, and also by contemporary writings.

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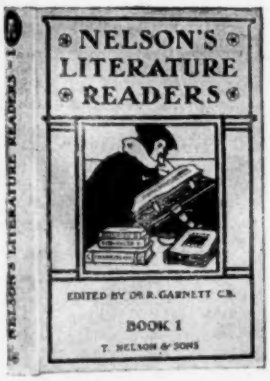

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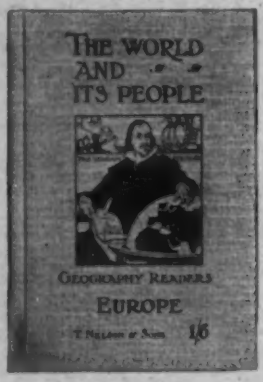

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